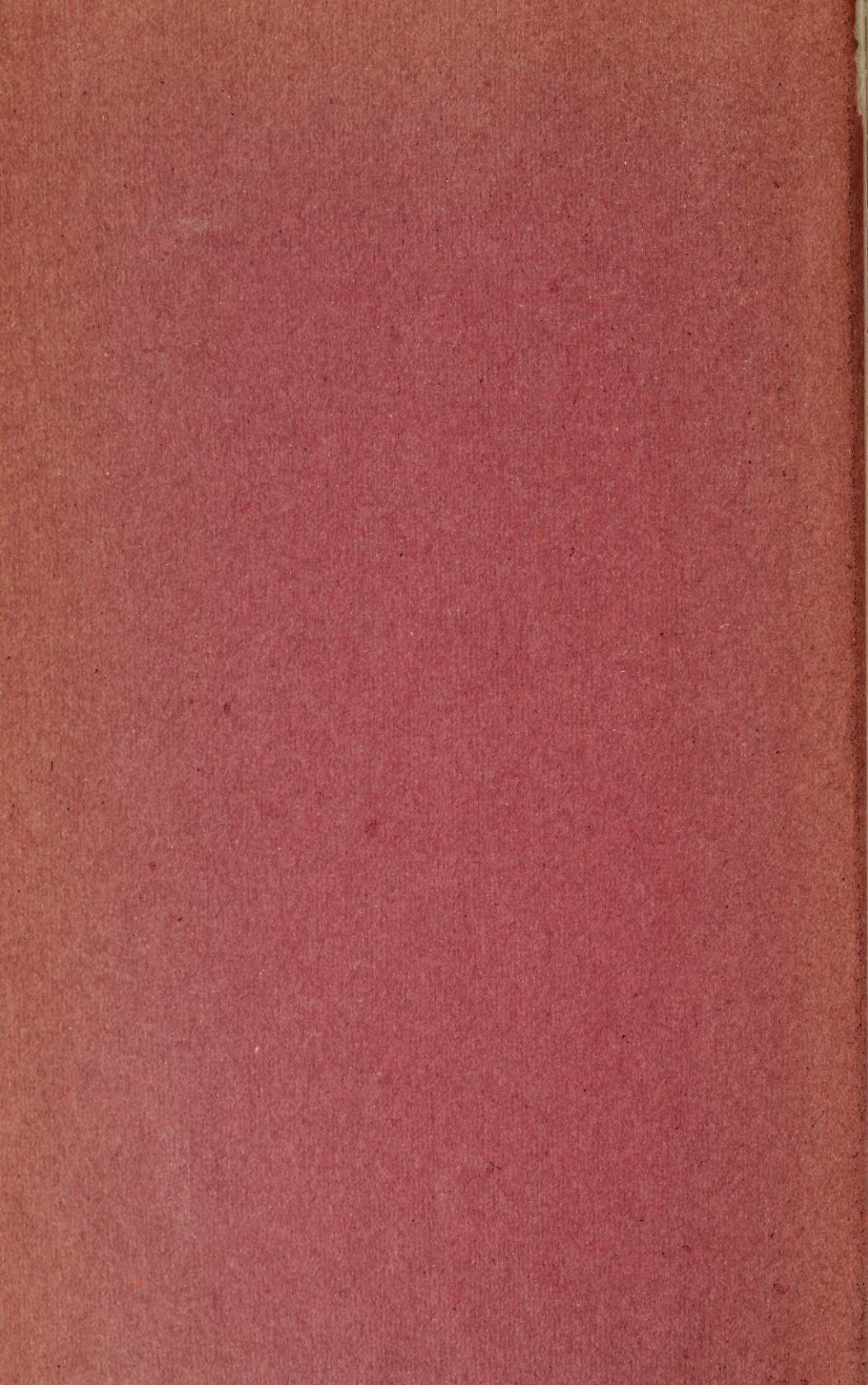
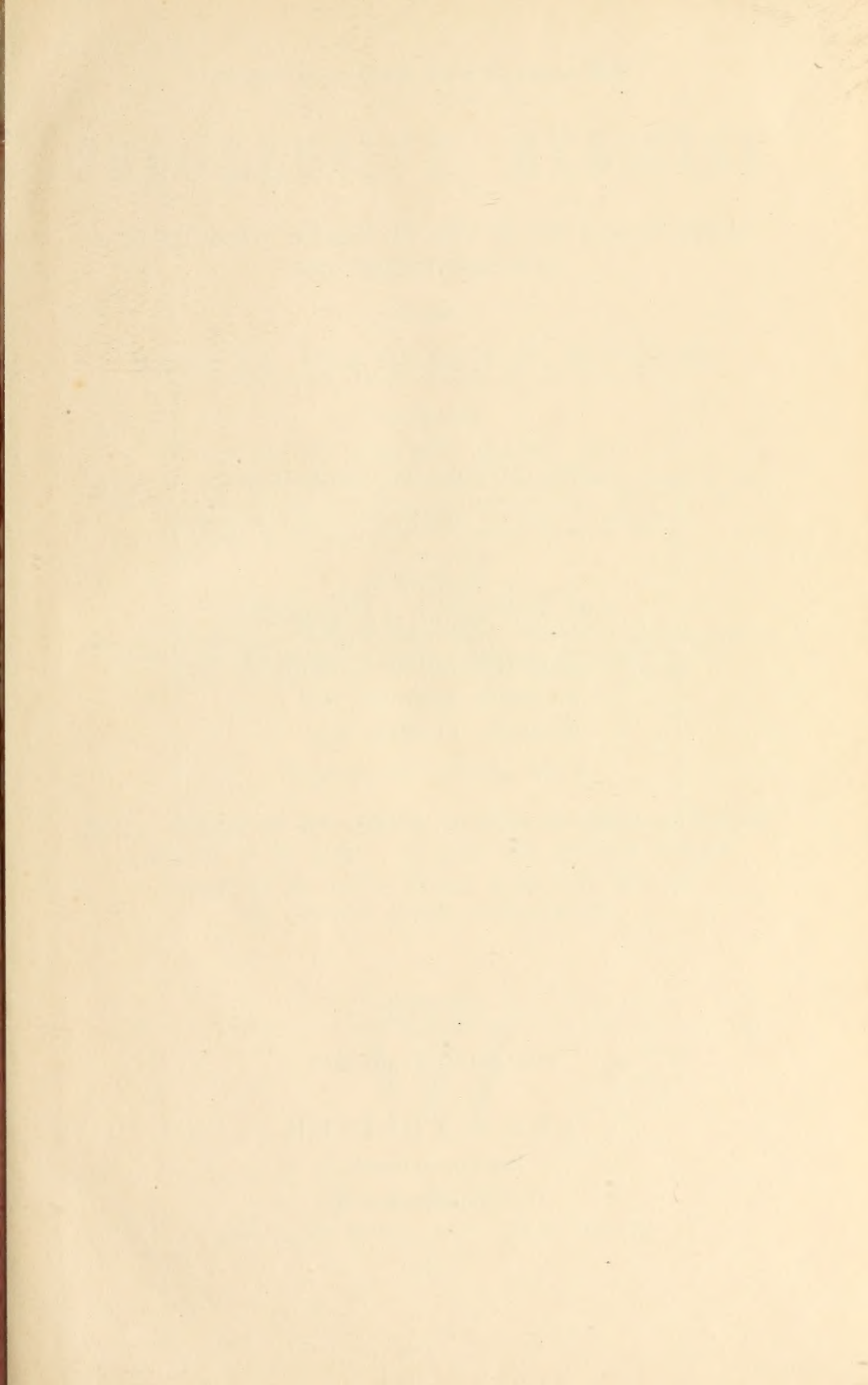




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PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

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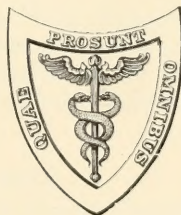
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—DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES.
DISEASES OF THE SPLEEN, THYROID GLAND, NUTRITION, AND
THE LYMPHATIC SYSTEM—OPHTHALMOLOGY.




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PROGRESSIVE MEDICINE

JUNE, 1911

HERNIA

BY WILLIAM B. COLEY, M.D.

Silver Wire and Linen Thread for the Cure of Hernia. In the *Annals of Surgery* for November, 1910, Wiener makes another strong plea for the use of silver wire and linen thread for the cure of hernia.

He states that it is just ten years since his attention was first called to the subject of wire filigree almost simultaneously by Witzel and Goepel.

It should, however, be noted that A. M. Phelps is one of the earliest and strongest advocates of the use of silver wire and wire filigree, and published a very large number of cases treated by this method. Later, Willy Meyer, of New York, and Bartlett, of St. Louis, reported further observations, and strongly advocated the method. More recently MacGavin, of London, published a large series of cases, mostly in old people with larger hernial openings which were closed by silver wire. MacGavin's paper has the advantage of a more careful observation of late results of such operations than any of the previous papers, and his article I reviewed in PROGRESSIVE MEDICINE of 1910.

Why there should be a sentimental objection to putting a so-called foreign body into the wound, in the shape of silver sutures or a filigree, Wiener states he has never been able to understand. He further says, "And why some men should prefer to do most extensive plastic operations for the cure of hernia, which often fail to give a permanent cure, however pretty they may look on the table, in place of the simple and reliable procedure of using a filigree, is also hard to understand." He states that the usual objection we hear is, that the filigree will irritate and will have to be removed. His answer to this is, that if the proper wire is used in the first place, if the filigree is made properly in the second place, and if it is properly introduced in the third place, it will very seldom be necessary to remove a filigree; he has only once been compelled to remove one.

I have consistently opposed any but the most limited application of these methods, the introduction of wire filigrees and the extensive use of silver wire in the hernial canal, in the radical cure of hernia, and my objections have not been theoretical, but based upon a very extensive experience, at the Hospital for Ruptured and Crippled, with the after-results of cases operated upon by these methods. It is probably true that the surgeon who introduced the silver wire seldom finds it necessary to remove the sutures or filigrees, the reason being that when the sutures begin to cause trouble, the patients, for various reasons, go elsewhere for their removal.

That such sutures not infrequently do cause irritation, resulting in sinuses that continue until the offending sutures are removed, has been abundantly proved by the records of the Hospital for Ruptured and Crippled, as published by Dr. Bull and myself. The fact that they have to be removed is by no means the most serious part of the trouble. The long-continued suppuration that often occurs before their removal so weakens the hernial canal that, in the great majority of cases, a recurrence quickly follows.

It is very well to say that such results would not occur if the "proper wire is used, the filigree properly made, and, finally, properly introduced." It is very evident that a perfect fulfilment of these three conditions may not always occur, even in the hands of good surgeons. I have recently had occasion to operate upon two cases, from leading German clinics, in which sinuses had occurred in young women with hernias easily curable by the ordinary absorbable sutures of kangaroo tendon or chronic gut, but in which silk sutures had been used which had to be removed six months and a year afterward on account of persistent sinuses.

Wiener states that, during the past eighteen months, he has entirely discarded the use of chronic catgut in hernia cases, having been led to this step by seeing several hernias, operated upon by competent surgeons, recur within six weeks after the time of operation, all the cases being simple inguinal hernia which had healed without any infection. These results he explains as either due to the catgut knots opening as a result of coughing or vomiting, or the catgut having become absorbed too soon.

I believe that another explanation can be found and, in fact, is more probable, namely, that the operation itself was not properly performed. While the Bassini operation was introduced twenty years ago, it is by no means true that its principles are fully understood and its technique properly carried out by all general surgeons, and even very competent ones. That recurrences are not due to a knot becoming untied, or to too quick absorption of the sutures, is abundantly proved by the results at the Hospital for Ruptured and Crippled. During the last twenty years 3048 hernia operations have been performed, and in the entire number,

with the exception of the first twenty cases, absorbable sutures were used, nearly all kangaroo tendon, and, in a few cases, chromic catgut. These cases have been very carefully traced and there has been less than 1 per cent. of relapses in the entire number. This is a much higher percentage of permanent cures than has ever been obtained by the use of non-absorbable sutures either here or in Europe.

In view of these results, it would seem rather illogical to assume that the recurrences referred to by Wiener were due to the suture, and not to some other cause.

A careful analysis of the individual cases, published by Wiener in support of the use of silver wire, fails to convince us of the necessity for the use of silver wire. The great majority of these cases, I believe, could have been quite as satisfactorily operated upon by plastic operations and the use of kangaroo tendon, with permanent results quite as good. The following is a brief analysis of Wiener's cases:

Case 1. Male, aged fifty-three years, with a very large hernia; silver filigree was used for closure. Death occurred on the sixth day, caused "by the fact that the abdominal cavity could not accommodate itself to the large amount of intestines that had been in the sac."

Case 2. Female, aged thirty-four years; ventral hernia following abdominal operation four years before. Filigree wire was used; the patient was well five and one-half years afterward, without relapse.

Case 3. Male, aged thirty years, showed right inguinal hernia of three years' duration; another on the left side, of one year duration. The left side was operated upon by Wiener, by running silver suture, so as to make a figure-of-eight filigree. The right side was operated upon by Bassini's method, twisted silver being used for the sutures. Both wounds healed by primary union. *No subsequent history.*

Case 4. Male, aged thirty-seven years, had ventral hernia of two months' duration; in May, 1905, it was operated upon with silver filigree; primary wound healing followed. It is stated that the man has not suffered any discomfort from the wire, but *no date of last observation is given.*

Case 5. Female, aged twenty-four years; operation was performed on July 10, 1905, for hernia following an appendicitis operation four years before; this consisted of a hernioplasty, with resection of gut; through-and-through silver wire sutures were used; the wound was drained; slight fecal discharge occurred for two weeks; the patient left the hospital with a healed wound, August 16, 1905. It is stated that "since then the girl has been doing arduous housework without pain or discomfort." *No date of the last observation is given.*

Case 6. Female, aged thirty years, had an umbilical hernia, of five years' standing, the size of an orange; three sutures of silver wire almost completely obliterated the diastasis at the neck of the sac; a small cigarette drain was used. The wound healed in sixteen days.

Three months later, after a severe attack of bronchitis, the patient developed a recurrence just below the umbilicus. Wiener states that "had a filigree been put in besides the silver wire, this would probably not have occurred."

Case 7. Was not a hernia at all, but an operation for a tumor, and will not be considered here.

These seven cases were reported by Wiener¹ in his earlier paper. With the exception of the first case, which died of the operation, and omitting the seventh, in which the operation was done for a tumor, these cases were all under the age of forty, namely, thirty-four, thirty, thirty-seven, twenty-four, and thirty years. I have never met with a hernia in a person under forty years of age that could not be satisfactorily closed without the use of silver wire. The umbilical hernia the size of an orange, in a woman aged thirty years, it would seem could have been easily operated upon by the Mayo method (overlapping method), by which procedure they reported one hundred and twenty-five cases several years ago, including herniae of enormous size in stout women, with only one relapse, without the use of non-absorbable sutures. None of Wiener's cases were traced for any length of time after the operation, with the exception of one. Wiener then proceeds to give the cases operated upon since 1905, twenty-two in number.

Case 1. Male, aged sixty-two years, had right inguinal hernia of ten years' duration, and left inguinal hernia for two years; running silver wire suture was used; no filigree; both wounds healed by primary union. *Subsequent result not given.*

Case 2. Male, aged fifty-five years; left inguinal hernia of many years' standing; silver wire cable sutures were used; primary wound healing occurred. *Subsequent history not given.*

Case 3. Female, aged thirty-three years; umbilical and ventral hernia; silver wire filigree, with running suture of silver cable wire, was passed through the edges of the superficial fascia in the form of a filigree. Time of operation, fifty-five minutes. The patient died of post-operative pneumonia.

Case 4. Male, aged twenty-two years; typical Bassini operation was done two years before for right inguinal hernia, in which chromic gut sutures had been used. The wound healed by primary union. On June 28, 1907, an operation for a recurrent, reducible inguinal hernia was performed; three silver wire sutures were passed below the cord; the wound healed by primary union. *Subsequent result not given.*

Case 5. Male, aged thirty years; right oblique and left direct inguinal hernia. Chromic gut was used on right side; silk on left. The wounds healed by primary union. *Subsequent results not given.*

Case 6. Male, aged forty-five years, had right inguinal hernia of six months' duration; two chromic sutures, plus four silver wire sutures

¹ Annals of Surgery, April, 1906.

were used. Left side, enlarged ring. Primary wound healing occurred. *Subsequent result not given.*

Case 7. Male, aged eighteen years, was operated upon five months before for infantile inguinal hernia; he had a recurrence soon after leaving the hospital. The first operation was performed by Dr. Wiener, using six No. 2 chromic gut sutures. The second operation was performed on July 24, 1907, when the internal oblique was sutured to Poupart's ligament with silver wire cable suture. There was primary wound healing; discharged. *Subsequent result not given.*

Case 8. Male, aged forty-two years, was twice operated upon for left inguinal hernia; first, at the German Hospital, in Philadelphia; second, at Mt. Sinai, of New York; there was a recurrence three months after the second operation. A third operation was performed on January 3, 1906; several silver wire cable sutures were used to unite the internal oblique and Poupart's ligament. The wound healed by primary union. *No later history given.*

Case 9. Male, aged twenty-three years, had left inguinal hernia of three months' standing. Operation January 14, 1908; deep chromic gut sutures, reinforced by three silver wire sutures were used. Uneventful recovery; patient went home on February 5. *Subsequent result not given.*

Case 10. Male, aged fifty years; operation January 23, 1908, for double inguinal hernia.

Case 11. Male, aged thirty years; left inguinal hernia. In addition to chromic gut, several silver wire sutures were used to sew the muscle to the periosteum of the pubes, and also to Gimbernat's ligament. *Subsequent history not given in either case.*

Case 12. Male, aged forty years, was operated upon three months before at Mt. Sinai Hospital; a typical Bassini operation was done on one side; a Ferguson modification on the other; chromic gut sutures were used. There was slight recurrence on both sides. Re-operated upon on March 3, 1908; silver wire cable used. Both wounds healed by primary union. *Subsequent history of the case not known.*

Case 13. Male, aged twenty years, had been operated upon by Wiener in November, 1907, for double inguinal hernia; chromic gut sutures were used. The hernia recurred soon after returning home. He was re-operated upon in August, 1908; both herniæ were easily reducible; running silver wire sutures were used; the wounds healed kindly. *Subsequent history not stated.*

Case 14. Female, aged fifty-four years, was operated upon for recurrence of a hernia; six silver wire sutures were used. *Subsequent result not known.*

Case 15. Female, aged thirty-eight years, was operated upon for double inguinal hernia five years before. A second operation was

performed on January 2, 1909; five silver wire cable sutures were used; the patient made an uneventful convalescence. *Later result not stated.*

Case 16. Female, aged twenty-six years, had an operation performed for ventral hernia, following an appendicitis operation two years before. On June 17, 1909, the muscle and fascial flaps were dissected back far enough on either side to admit placing two silver wire filigrees, each 3 by 5 inches, between the peritoneum and the fascia. Primary wound healing occurred. The patient left the hospital in two weeks. Wiener states that, as this was a private case, he was able to follow it carefully. In spite of the large amount of silver wire employed in this case, the patient suffered no discomfort therefrom. The wound has remained solidly healed. "We doubt very much whether we could have obtained as satisfactory a permanent result with any other suture material." As this case was operated upon on June 17, 1909, and was published in the *Annals of Surgery* for November, 1910, the interval of observation is obviously too short to speak of a permanent result. I do not agree with Wiener that a satisfactory permanent result could not have been obtained without the use of the silver filigrees. More than twelve years ago, Dr. Bull and myself operated upon a ventral hernia larger than a child's head, that had developed in the scar of an operation for acute appendicitis, with drainage, some years before. In this case, the patient was over fifty years of age, with flabby abdominal muscles. A muscle and fascia flap were carefully dissected free, and the wound closed by wide overlapping of the external oblique aponeurosis, similar to the method employed by the Mayo's in umbilical hernia; chromicized kangaroo tendon was used for all the buried sutures and the patient is still in perfect health, without a trace of recurrence, twelve years later. This certainly was a much more severe test than the foregoing case of hernia of only two years' duration, in a woman, aged twenty-six years.

Case 17. Female, aged twenty-five years. Operation was performed on March 29, 1909, for umbilical hernia of nine months' duration, following difficult labor. On account of endocarditis and nephritis, a rapid operation was performed. The musculo-aponeurotic layer was broadly overlapped by a running suture of silver wire. *No after-history given.* That chromicized catgut would have done quite as well as silver wire in such a case, is amply proved by the very large number of umbilical herniæ operated upon by the Mayos who always use absorbable sutures in these cases.

Case 18. Female, aged fifty-four years, presented an umbilical hernia of many years' standing, the size of a man's fist; the fascia was overlapped from side to side with silver wire sutures. *After-history not given.*

Case 19. Male, aged sixty-five years, with a right inguinal hernia of twenty-five years' duration. On September 29, 1909, a Bassini operation was performed; sutures of silver wire were used, the cord being buried. A silver wire fligree, 1 by 3 inches, was inserted into the muscle. A post-operative hematoma in the tunica vaginalis broke down and caused a profuse purulent discharge. The patient left the hospital on October 27, with a sinus that has persisted, although the discharge has become very scant.

Case 20. Male, aged twenty-two years, was operated upon by another surgeon, March, 1905. A second operation for a recent recurrence was performed on February 12, 1910; five silver wire sutures were used. *Later history was not given.*

Case 21. Male, aged fifty-one years; on February 14, 1910, operation was performed for right inguinal hernia of two years' standing, of large size; the wound was closed with silver wire sutures. *No after-history stated.*

Case 22. A patient, aged four years, had congenital left inguinal hernia with undescended testis. Operation, February 28, 1910. Six silver wire and three linen sutures were used to join the conjoined tendon to Poupart's ligament. *Later history not known.*

Even the brief analysis that has been given of these cases is sufficient to show that they are far from convincing. In a series of twenty-eight cases, only 10 were over forty years of age, and only 14 over thirty years of age.

Yet, without further evidence than this, Wiener asks the question: "Is it not time to call a halt on the promiscuous use of chromic gut in herniotomies? Have we not been worshipping a fetich too long?" He further adds: "The startling number of immediate recurrences after the Bassini operation with chromic gut, in which the original operation was done by various surgeons (and once by the writer—Wiener) reported above, are surely worthy of serious consideration." Again he states: "There will surely be less recurrences, both early and late, with linen sutures than with chromic gut or kangaroo tendon. And is it not to be expected that we will have much better results in recurrent cases if we use silver wire instead of catgut?"

His conclusions are:

1. Chromic catgut is an unreliable suture material.
2. Pagenstecher linen is an excellent suture material.
3. Silver wire, in some form, is a very desirable suture material in many recurrent cases, and at primary operations where the tissues are poorly developed.
4. Immediate recurrence, in uninfected cases, is usually due to chromic gut.
5. We will have fewer recurrences if we entirely discard chromic gut sutures.

A brief analysis of the results of our operations at the Hospital for Ruptured and Crippled, in which kangaroo tendon for the buried sutures has been used for the last twenty-one years, together with the results of the Mayos' operations, not only in inguinal, but especially in the large umbilical hernia, is sufficient to show that practically perfect results can be obtained by absorbable sutures. "The startling number of immediate recurrences after the Bassini operation with chromic gut" will have to be explained by errors in technique, rather than the gut, as such. That serious trouble not infrequently follows the use of non-absorbable sutures of all kinds has already been abundantly proved. It is unfortunate that the after-histories of Wiener's cases could not have been given, to throw some light upon this point.

As far as I know, Phelps, of New York, was the first to advocate the use of silver wire filigrees. His second paper, reporting some 252 cases, appeared in the *Medical Record*, September 22, 1900, and I reviewed the article at some length in *PROGRESSIVE MEDICINE* of 1901. Phelps advocated placing a mattress of fine silver wire between the transversalis and internal oblique muscle and suturing the deep layer of muscles with a continuous silver wire. In cases of large hernial openings, with much attenuation of the muscular coats of the abdominal wall, he places a second mattress wire between the deep and superficial layers of muscle. He stated that since 1892 he had operated upon 216 cases of hernia, of which 46 were relapsed Bassini's, and 51 from other operations, chiefly McBurney's. In addition, he closes all abdominal wounds with silver wire fortified after his method, original as far as he knew. He ventured to predict at that time that Bassini's operation and all others, except the one there proposed, would be abandoned by every operator.

Eleven years have passed since this was written and, as far as I know, Bassini's method is quite as universally employed as at that time. The improvements of technique in carrying out the details of this operation have, I think, caused a marked decrease in the number of recurrences.

Phelps' method, or modifications of it, was later strongly advocated by Dr. Willard Bartlett,¹ of St. Louis, and later by Willy Meyer.²

In spite of these various papers, however, the use of silver wire in hernia has been adopted by few surgeons.

In discussing Phelps' paper in *PROGRESSIVE MEDICINE*, June, 1901, I said: "We must take issue with the statement of Phelps, 'that the wire cannot cause suppuration, inasmuch as suppuration is not produced by any foreign body.' This is only partially true. It makes

¹ *Annals of Surgery*, July, 1903; *PROGRESSIVE MEDICINE*, June, 1904.

² *Transactions of the American Surgical Association*, 1902. *PROGRESSIVE MEDICINE*, 1903.

little difference to the patient whether the silver wire itself produces suppuration, with a consequently slowly healing sinus, or whether the irritation of the silver wire or foreign body causes a localization of the bacteria which in some unknown way effect an entrance to the region of the wire; the result is the same, and slowly healing, troublesome sinuses do develop in a considerable number of cases in which the original buried suture was absolutely sterile and the wound healed by perfect primary union. As previously stated, this condition actually did occur, and a year later the patient had to seek relief in a second operation for removal of the wire.

"I have recently observed a patient, aged fifty-one years, who was operated upon at the city hospital by Dr. Phelps' method, in January, 1900, for a small reducible inguinal hernia. The patient states that a sinus followed the operation, and that this sinus failed to heal, though he was kept in the hospital from January until May. In April, the sinus was curetted by one of the other attending surgeons, and some wire was removed. He left the hospital in May with the sinus still open; he was treated in the out-patient department of the Hudson Street Hospital until December, when the remainder of the wire was removed. Not until then did the sinus heal. When I examined him, February 21, 1901, there was a relapse the size of two fists, and the cicatrix, six inches long by one-half inch in width, was so thin and tender that the rupture could not possibly be controlled by a truss. A second operation in the presence of so much cicatricial tissue offers little hope of relief, and the patient, otherwise in good health, has not only been incapacitated for work for more than one year, but seems destined to be an invalid for the rest of his life."

Since 1891, at the Hospital for Ruptured and Crippled, there have been performed 3048 operations for all varieties of hernia. All of these cases have been operated upon by using absorbable sutures; chromicized tendon of kangaroo for the buried sutures and catgut for the skin. A great effort has been made during all of these years to trace these cases to final results. The last complete analysis of them, extending up to January 1, 1910, showed less than 1 per cent. of relapses in the entire number.

There have been 1451 cases operated upon by transplantation of the cord, with 9 relapses, or 0.61 per cent.; without transplantation of the cord, there have been 578 cases, with 6 relapses, or 1.4 per cent.; 502 cases of inguinal hernia in the female, with 3 relapses, or 0.59 per cent.; 110 cases of femoral hernia with no relapses; 127 cases, with 22 relapses, or 22.8 per cent.

These results, so far as I have known, have never been equalled by any other statistics. Besides, I have personally operated upon 1200 cases of hernia, outside of the Hospital for Ruptured and Crippled,

with very nearly identical results, using the same type of sutures and the same technique, having had less than 1 per cent. of relapses.

These statistics certainly disprove Wiener's contention that absorbable sutures are the chief cause of the relapses seen at the present time.

Dr. Howard A. Kelly, in the *Annals of Surgery*, May, 1910, described an operation for umbilical hernia which is a modification of the Mayo operation (Fig. 1). Dr. Kelly states at the outset that he has found that the from above downward overlapping operation of Drs. William

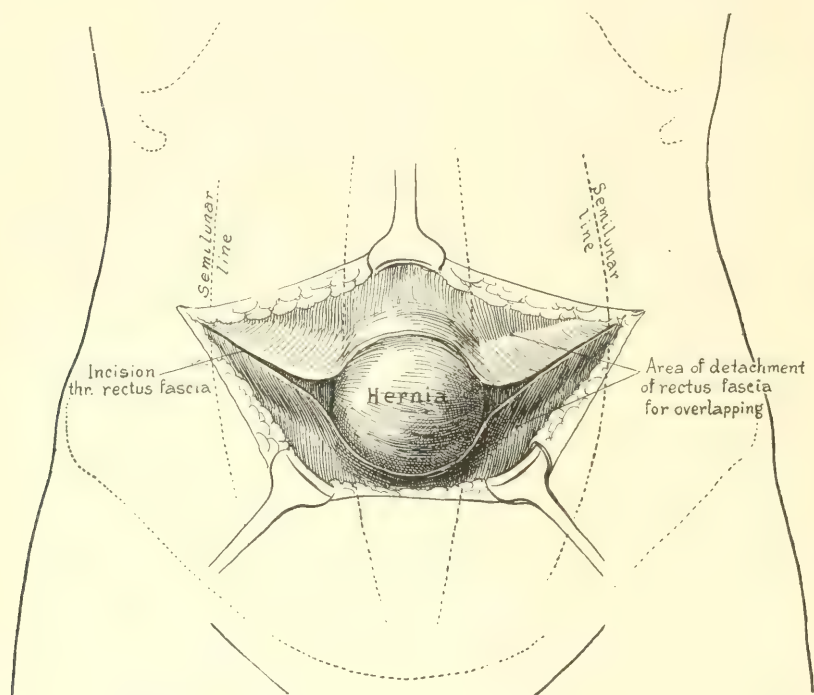


FIG. 1.—The diagram shows the patient lying in dorsal posture. A transverse incision at the level of the umbilicus has been made from the outside of one semi-lunar line across to outside of the other semi-lunar line. This incision is made directly at the level of the umbilicus, and extends through fat and the sheath of the rectus. The hernial sac is seen protruding between recti muscles.

and Charles Mayo, followed by suturing from side to side, is distinctly, in every way, the best and the most effective procedure for the treatment of an umbilical hernia. He believes, however, "that on account of the accumulated fat in the abdomen, the tension is sometimes considerable." For this reason, in most of his later cases, he has adopted a more radical plan of procedure which is still based on the fundamental idea of the originators, *i. e.*, to make an incision from the right and left margins of the hernial opening all the way across and through the strong fibrous sheaths of the recti and then to detach and raise the sheath from

the recti above and below for 2 to 3 cm. The peritoneum is sewed together with catgut. "Next," he states, "I haul up and sew the free margin of the lower under the upper flap from side to side with four to six interrupted silk sutures, using, if needs be, catgut between them. Then the free overhanging margin of the upper flap is sewed by a continuous catgut suture to the fibrous tissues, which step completes the supporting part of the operation. The various steps of the operation are well shown in Figs. 1, 2 and 3.

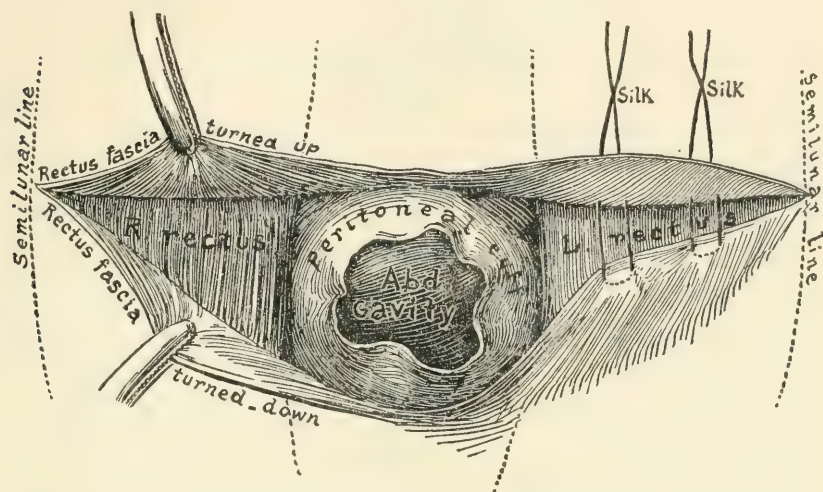


FIG. 2.—Shows peritoneal cavity opening, sac removed, rectus sheath dissected free, and on one side silk sutures applied.

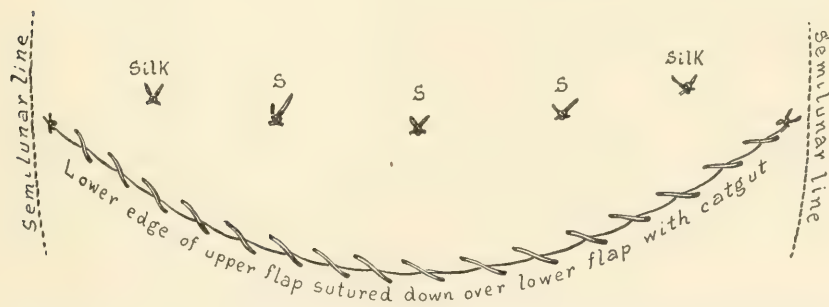


FIG. 3.—Shows all of silk sutures tied and the lower edge of the upper flap sutured down to lower flap with catgut.

I believe that, in certain cases, it is necessary and wise to extend the incision on either side of the rectus muscles—and this plan has been adopted by the Mayos in selected cases, but I am very strongly of the opinion that it is unwise to use "four to six buried, strong silk sutures as a permanent support to hold the lower flap snugly up under the upper one." My reasons against the use of these buried sutures in any form

of hernia operation have already been given at some length in my discussion of Wiener's paper. I have just operated, within a few days, upon the largest and most difficult ventral hernia, following an appendicitis operation, that I have ever seen, and this case illustrates very well the defects of certain methods of closing the abdominal wall. The original operation in this case had been done nine years previously, for a simple non-suppurating appendicitis; the wound was closed without drainage; however, through-and-through silkworm gut sutures were used and within one and one-half years after operation there developed a hernia at the site of the wound, about the size of an egg. This hernia was operated upon by the surgeon who preformed the original appendicitis operation, and he again closed the wound by through and through sutures of silkworm gut, burying, however, a certain number of them. Before the patient left the hospital suppuration occurred and several of the sutures were extruded, and when he left the hospital there was a hernia several times larger than when he entered. When I operated upon him, it was nearly as large as the adult head, with a large mass of adherent omentum with numerous intestinal adhesions. In spite of its size, however, and the difficulties connected with its having been the third operation upon the same region, I succeeded in getting two good overlapping layers with kangaroo tendon, the wound united by primary union, and I do not believe he will ever have a relapse.

Here, if ever, one would say at the outset, it was a case in which the opening could not be closed without silver wire or silver filigree.

Intra-abdominal Herniæ of the Foveæ Supravesicales. A. Reich¹ brings an article on the subject of intra-abdominal herniæ of the foveæ supravesicales which, in view of the rarity of this type of hernia is of considerable interest. He reports two recent cases observed at von Bruns' clinic within two months of each other, and describes a specimen shown by Küttner before the meeting of Natural Philosophers at Meran, 1906. In addition to these newer cases, Reich was able to collect six others from the literature, making a total of nine undoubted cases of intra-abdominal herniæ of the supravesical foveæ. He further describes five cases reported in the literature, which, however, he does not consider as belonging to this group of herniæ; and two others, which he thinks may probably have been intra-abdominal supravesical herniæ, although they were not recognized as such by the authors.

Reich states that, according to their location, these herniæ should be divided into: (1) Interligamentous; (2) true median; (3) false median.

Those of the *interligamentous variety* are by far the most frequent, and must be considered the type of internal supravesical herniæ. These herniæ have their opening laterally from the median line, *i. e.*, in the right or left supravesical fossa, and are bounded laterally by the

¹ Beitr. z. klin. Chir., 1909, Band lxii, Heft, 1 p. 20.

lateral, and medially, by the median umbilical band. Seven of the nine true cases reported by Reich were of the interligamentous type, *i. e.*, 4 on the right, and 3 on the left side; bilateral cases have not as yet been recorded. The sacs of these herniæ have the typical tendency to push downward in a more or less exact vertical direction, thus invading the prevesical space and getting into conflict with the bladder.

All of the 9 true cases of intra-abdominal supravescical hernia occurred in men, which, Reich thinks, may be due to the greater exertions and more exposed life of men, rather than to any sexual difference.

With regard to the *contents of the sac*, it is stated that the same usually consisted in a loop of small intestine.

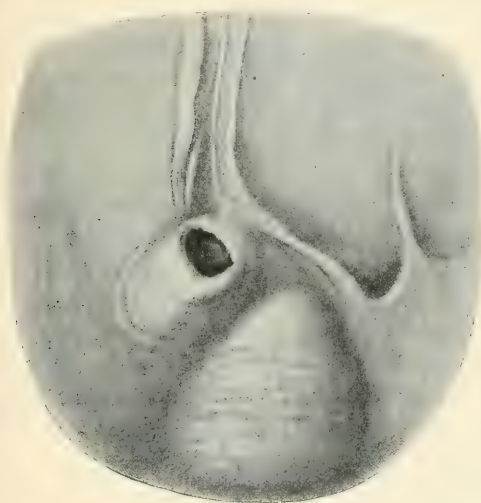


FIG. 4

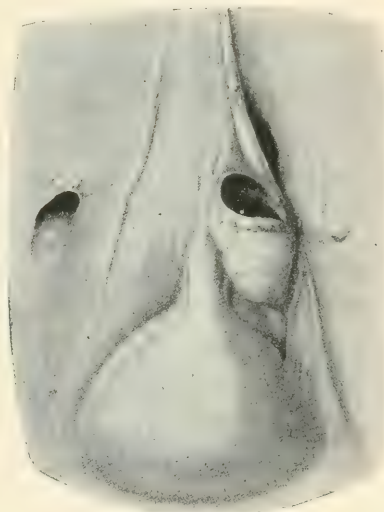


FIG. 5

As regards the *origin of these internal supravescical herniæ* it would seem, from the anatomical peculiarities described by Reich, that they were due to a congenital predisposition in some way etiologically connected with the development of the urachus and umbilical arteries (Figs. 4 and 5). A trauma certainly does not come into consideration in connection with the actual origin of this type of hernia, although it cannot be disregarded in cases of incarceration.

The *diagnosis* of free internal supravescical herniæ will probably never be rendered, owing to the lack of characteristic symptoms; even in the incarcerated cases it is most difficult, and was not made in a single case before operation.

Reich states that, under favorable conditions, it may be possible in rare cases, with the help of all diagnostic aids at our command, to definitely establish the diagnosis; in the majority of cases the symptoms present should suffice for the assumption that an incarcerated internal

supravesical hernia *may* be present. The principal point is to bear in mind the disposition of the supravesical fossæ to typical internal herniæ.

Ileus, in these cases, proved but a very unreliable, indefinite sign, usually showing the characteristics of a subacute obturation, rather than a strangulation ileus due to incarceration. He mentions, however, the following *four signs* which may be of some value in *localizing the obstruction* as well as determining its character.

The first is a stiffening or distention of a loop of intestine, provided it can be clearly shown that it is directed toward the region of the symphysis.

Secondly, a circumscribed sensitiveness, spontaneous as well as on palpation in the region of the hernial opening, just above the symphysis.

A third sign may be found in the relation between an internal supravesical hernia and the bladder.

A fourth point to be considered is the constant absence of a palpable tumor.

Six cases were operated upon, and 3 were cured. They were forty-five, twenty-two, and fifty-nine years of age, and incarceration had existed three, four, and six days respectively. Both of the cases, operated upon at von Bruns' Clinic, died; the specimens obtained at autopsy are shown in the accompanying sketches.

External Herniæ of the Foveæ Supravesicales. Reich¹ contributes an interesting paper on the subject of external herniæ of the foveæ supravesicales. He states that these herniæ are not as extremely rare as would seem from the scant literature on the subject. He succeeded in collecting 26 positive cases, 12 of which were taken from the Italian literature. One of the cases in the collection (Astley Cooper, 1909) is of special interest, as six hernial openings were found (Fig. 6).

Reich gives a detailed description of the anatomical conditions present in this type of hernia, of which the accompanying sketch gives a fair idea (Fig. 7).

With the exception of 2 cases, all of the cases were unilateral, 13 on the right, 7 on the left side.

This variety of hernia is far more frequent in males than in females, 21 having been observed in men, 3 in women; in 2, the sex is not stated. Reich believes that sexual differences could hardly come into question for the development of these herniæ, and states that the great preponderance of the male cases must be ascribed principally to the fact that men lead a less guarded life than women.

As regards the ages, Reich's statistics show that external supravesical herniæ have not, thus far, been observed in patients below thirty years of age; 3 occurred in the fourth decade, 4 in the fifth, 5 in the sixth,

¹ Beitr. z. klin. Chir., 1909, Band lxii, Heft 1.

6 in the seventh; 2 were over seventy years of age. This shows that twice as many cases occurred in patients over fifty years (13) than below (7).



FIG. 6

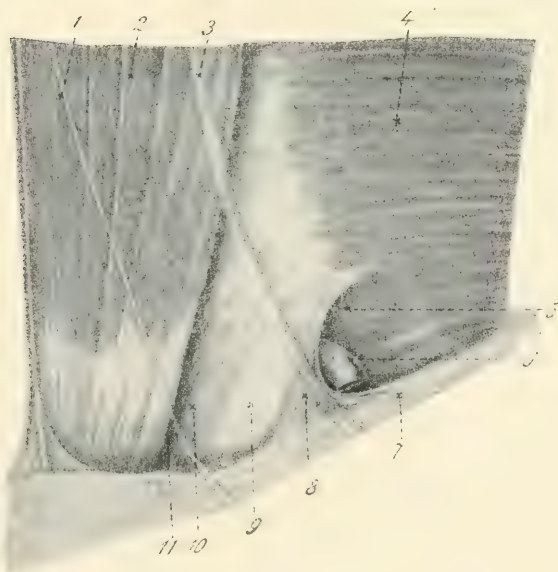


FIG. 7

The time between the development of the hernia and its recognition and operation was often very short. In 5 cases, it was from a few days to a few months; in 3, from ten to fifteen years; in 2, from five to ten years, and in 5, from one to five years.

It is of interest to note that the majority of external supravesical herniæ are associated with inguinal and crural hernia. This was observed fourteen times in the cases collected by Reich, and in 12 of these the two kinds of hernia were on the same side.

As to the origin of external supravesical herniæ, Reich states that the transrectal herniæ are probably due to a congenital fissure formation in the rectus insertion in connection with imperfect development of the other elements of the abdominal wall. The ordinary pararectal supravesical herniæ, he states, could not be congenital, as there is no process in the foveæ supravesicales which is analogous to the embryonal protrusion of peritoneum. The principal cause for the development of these herniæ, he thinks, consists in a congenital disposition of the abdominal wall, *i. e.*, in the formation of apertures in the *falx inguinalis*, and, secondly, in hypoplastic development of some, or all, of the elements of the abdominal wall in the region of the hernia.

All authors are agreed that the diagnosis, as a rule, cannot be definitely made before operation. Reich states, however, that it is not impossible provided the possibility of a supravesical hernia is taken into consideration at all. He holds that any one of the following signs should be sufficient to enable one to render a correct diagnosis:

1. Location of the hernial tumor medially to the external subcutaneous inguinal ring, in the region of the *mons veneris*; or appearance of the tumor in the inguinal ring with its pedicle turned toward the median line.
2. The oblique direction, toward the median line, which the examining finger has to take in order to get to the hernial ring.
3. The fact that after reposition of, for instance, a median inguinal hernia, another hernial tumor remains medially from the former.
4. If a hernia, which does not emanate from the inguinal canal, shows a slender pedicle.

With regard to treatment, Reich states that despite the small size of these herniæ, a truss is often contraindicated on account of the irreducibility of the hernial contents; but also in the free herniæ it will seldom be possible to use a truss in view of the location of the hernial opening directly above the pubic bone. Hence, he considers radical operation to be the only treatment for these herniæ as soon as they give rise to trouble. For the radical operation, as well as for herniotomy, he believes Bassini's method to be the most suitable.

Anatomy and Treatment of Undescended Testis. Moschcowitz¹ discusses "The Anatomy and Treatment of Undescended Testis, with Special Reference to the Bevan Operation." He states that, during the last few years, his experience with the Bevan operation in 18 cases has given him results so immeasurably superior, that, from his point

¹ *Annals of Surgery*, December, 1910.

of view, a satisfactory operation for undescended testis has at last been attained. He first discusses at some length the anatomical varieties of the undescended testes, and the surgical anatomy of these.

Inasmuch as these subjects were somewhat fully dwelt upon in my last two articles in *PROGRESSIVE MEDICINE*, 1909 and 1910, I will not take them up again at present.

The reasons given by Moschcowitz for operating on the undescended testicle are, in my opinion, very sound; the first and most important is that every undescended testis is accompanied by a hernia, either actual or potential. While this has been denied by some, particularly Torek, my own experience agrees with Moschcowitz's. In about two hundred operations for undescended testis, I have seen only one in which there was no hernia present.

The second reason given by Moschcowitz is that the undescended testis is more subject to trauma than the normally situated testis. He further emphasizes the importance of the preservation of the testicle, on the ground that it possesses two functions: first, the elaboration of spermatozoa; second, the maintenance of sexual characteristics. He states "the preservation of the second function is, therefore, a paramount indication for a conservative operation upon an undescended testis, especially in the young." This point I have strongly urged in former years, and especially a year ago when discussing Rawling's paper. That the simple replacement of the testicle into the scrotum, restores the spermatogenetic function, Moschcowitz is not entirely convinced, although he believes in the possibility of it. The spermatogenetic function is not always absent in an undescended testis, as shown by Rawlings' paper in *St. Thomas' Hospital Reports*. His paper contains some 50 cases, in which the testes were removed at operation and a careful microscopic examination afterward made, showing that the spermatogenetic function was present in many cases.

As further indications for operating upon the undescended testis, Moschcowitz mentions its liability to certain accidents, particularly that of torsion of the spermatic cord; furthermore, the extension of a gonorrhea to a retained testis, or metastatic involvement in mumps, and lastly, a minor reason, the psychic depression under which adults suffer when only one, or worse still, when neither testis is in the scrotum. He believes there is no contraindication, except extreme youth. This, however, he states, merely implies a postponement of the operation to a suitable age. He has personally decided upon the age of three as the lowest limit, and postpones operation in all younger cases, unless forced to operation by strangulation or other accidents.

As I have already stated in a previous article in *PROGRESSIVE MEDICINE*, I believe operation should not be performed in very young children, for the reason that in a considerable number of cases the testes enter the scrotum on the approach of puberty, without operation. I

have rarely operated upon cases under the age of seven or eight years. The coincidence of a hernia, however, which is difficult to control or threatens strangulation, would be an indication for operating on the younger cases. I have recently operated for hernia upon a man, fifty years of age, a clergyman and physician (medical missionary), who had double undescended testis in early childhood, and neither testis came down until the age of puberty. He was later married and became the father of a number of children. The testes, at the time of my operation for hernia, were fully developed and larger than the average normal testis.

Moschcowitz gives a brief description of a number of the older operations, and a detailed description of Bevan's. He states that the distal part of the sac can be dealt with in three different ways: (1) It may be cut off close to its attachment to the testis; (2) it may be cut off some distance from the testis, and a new tunica vaginalis formed; (3) it may be everted and sutured. He states that he has used all three methods, but prefers the first.

Personally, I have always employed the second, *i. e.*, cutting off the sac some distance from the testicle, and, with a purse-string suture, constructing a new tunica vaginalis.

With regard to bringing the testis down into the scrotum, Moschcowitz states that "in some instances, freeing the vessels of all extrinsic fascial structures by teasing and occasional snips with the scissors, will enable the testicle to be brought down. In most cases this will not suffice, and we have to proceed to the essential part of the Bevan operation, namely, the division and ligation of the spermatic vessels."

It will be seen that he describes the division and ligation of the spermatic vessels as the essential part of the Bevan operation. This is not so regarded by Bevan himself, and is not resorted to by Bevan except in unusual cases. It should be pointed out that this step, though in the majority of cases it may be followed by no harm to the testicle, in a certain number of instances (three of which I learned from personal communications of other surgeons) is followed by gangrene of the testicle. There are certain cases, however, in which the testicle cannot be brought down without this step, and I have not hesitated to employ it in these cases. I have used it in about a dozen cases without any harmful results.

Moschcowitz states that he has performed a series of experiments upon dogs, at the Pathological Laboratory of the College of Physicians and Surgeons, dividing the spermatic vessels, leaving the testicle *in situ*, and removing the testes at periods varying from four days to three weeks after operation, and that in no instance did gangrene occur, although, microscopically, some of the testicles showed some necrosis in the interior.

Moschcowitz then proceeds to give the results in eighteen patients

upon whom he operated by the Bevan method, 4 bilaterally, making 22 operations. He states that all these cases can be legitimately regarded as completely cured, as far as the descent of the testis and the hernia are concerned.

Non-incarcerated Hernia.—Leopold Imfeld¹ reports 454 cases of non-incarcerated hernia, operated upon at the Bern clinic (Kocher) from 1900 to 1903, and traced for from five to eight years. This series excludes all cases in which no sac was found at operation, as well as those which could not be carefully traced and those with incomplete histories.

Of the cases, 326 were males, with 295 external inguinal, 24 internal inguinal, 16 crural, 9 umbilical, 17 epigastric and 1 ventral hernia.

Of 92 female cases, 47 were external inguinal, 22 crural, 16 umbilical, 4 epigastric, 3 ventral hernia.

Of the inguinal herniæ, 60 were double, 3 were crural.

In addition, the following rare types of double hernia were operated upon:

Male	{	4 cases of right external inguinal hernia and left internal inguinal hernia.
		1 case of right internal inguinal hernia and left external inguinal hernia.
		2 cases of right external inguinal hernia and epigastric hernia.
		1 case of left external inguinal hernia and left internal inguinal hernia.
		2 cases of right external inguinal hernia and umbilical hernia.
		4 cases of right internal inguinal hernia and left crural hernia.
Female	{	1 case of epigastric hernia plus umbilical hernia.
		1 case of right crural plus left external inguinal hernia.
		1 case right crural plus right external inguinal hernia.
	{	1 case of two epigastric herniæ.

The herniæ varied from the size of a hazelnut to that of a man's head and larger, namely: 144 from the size of a hazelnut to an egg; 137 from the size of an egg to a fist; 69 from the size of a fist to a head and larger.

The ages of the patients ranged between six months and eighty years, the largest number of inguinal herniæ occurred in the third decade of life.

As regards the method of operation, it is stated that for the external or indirect inguinal herniæ, Kocher's invagination-transplantation method was principally employed. A pure Bassini operation was seldom done.

For internal or direct inguinal herniæ, the so-called old method was generally employed, consisting in isolation, high ligation and removal of the sac, followed by suture of the canal.

The crural herniæ were operated upon according to three methods: (a) Invagination-transplantation, the sac being transplanted slightly outward over the inguinal band; (b) transplantation without invagination; (c) old method.

¹ Deutsche Zeitschr. f. Chir. December, 1909.

Umbilical, epigastric, and ventral herniæ were treated by removal of the sac and closure of the hernial opening.

Only two deaths occurred in Imfeld's series of 454 cases, being a mortality of 0.44 per cent. These deaths were due, he states, to faulty technique and asepsis.

Primary wound healing was obtained in 99.1 per cent. of the cases. Silk was invariably used for the sutures.

As regards end results, in a series of 247 cases of inguinal and crural hernia, operated upon by the invagination-transplantation method, 14 relapses were observed which equaled 5.6 per cent., or 94.4 per cent. of permanent cures.

Hirschkopf, in 1900, reported 83 cases operated upon by this method, with but 1 relapse, or 1.2 per cent.

Daiches collected 90 cases with 3 recurrences which equalled 3.3 per cent.

Process of Incarceration in Hernia. Carl Ritter¹ gives a detailed description of his experimental investigations of the process of incarceration in herniæ.

According to his experiments upon animals, incarceration may be caused by subjecting to a temporary injury a loop of intestine that has previously been drawn through an artificially established hernial ring. This causes anemia and contraction of the loop, followed by relaxation and distention of the wall of the gut with inflammatory hyperemia and swelling. Thus the loop of intestine becomes too voluminous to pass back through the hernial opening, aside of the fact that, on account of impaired peristalsis, active retrograde motion through the hernial opening is rendered difficult.

As soon as a disproportion between the lumen of the gut and the hernial opening has occurred, symptoms of obstruction set in, which further facilitate incarceration.

Ritter found that the nature of the injury inflicted upon the intestine did not make any difference in the result, mere contraction-irritation of some duration, rendering the parts anemic, is capable of inducing incarceration.

Congenital Sacs in Inguinal Hernia. Hansen² (chief surgeon of the Marine Hospital, Kiel), in an article on congenital sacs in inguinal hernia, expresses the opinion that these congenital sacs play a far more important role in the formation of external inguinal hernia than has been hitherto accorded them. The material on which he bases his observations comprises 172 cases of external inguinal hernia—114 right, 58 left-sided, 5 double.

All these herniæ were observed in youthful, strong men between

¹ Arch. f. klin. Chir., 1908, Band lxxxvii, Heft 3.

² Ibid., 1909, Band lxxxix, Heft 4.

seventeen and thirty-four years of age, 148, or 86 per cent., being below twenty-five years. The herniæ were all of short duration; in 45 per cent. they had been noted less than a month; in 35 per cent. from one month to a year; the remainder somewhat longer. About a dozen of the cases could be operated upon within a week after the appearance of the hernia.

As regards the cause of these herniæ, he states that a true traumatic hernia was not observed. A gradual development could be assumed in 44 per cent; however, it should be stated that this gradual development, from the first drawing pains to the appearance of the tumor, usually occurred in a remarkably short time, occasionally within a few days. In the remaining 56 per cent. of cases the rupture became apparent immediately after some extraordinary effort, and was accompanied by more or less pain. The herniæ developing in this manner, Hansen calls "herniæ of force."

It is natural that in the 45 per cent. of cases in which the herniæ had existed less than a month they were relatively small; 27 per cent. had not passed the external ring.

As regards the contents of the hernial sac, the later was found empty at the time of operation in all but 15 per cent.; and in these latter the adherent omentum usually formed the contents.

Of decisive importance, as regards the frequency of congenital hernial sacs, are the signs that are noted in the sac itself and its relation to its surroundings. While, as Hansen states, there are no absolutely reliable signs proving the congenital character of a hernia, outside of the open vaginal process, there are, nevertheless, a number of signs that may be looked upon as proving the congenital origin of a hernia, partly because they represent peculiarities that are also found in the cases in which there is an open vaginal process. Former investigations regarding the partial obliteration of the vaginal process justify the assumption that such obliteration begins at about the middle between internal inguinal ring and scrotum, in the pars funicularis, and that it progresses more rapidly downward than upward. Zuckerkandl found a more or less patent vaginal process in 37 per cent. of the cadavers of children examined by him; Sachs and Engel, in 57 and 31 per cent. respectively of adult cadavers, and it was seen much more frequently on the right than on the left side. In view of the fact that external inguinal hernia occurs about twice as often on the right as on the left side, the foregoing points to the importance of the vaginal process in connection with the development of a hernia.

In view of the just mentioned findings as to the point of obliteration, Hansen considers it of interest that in 70 per cent. of his material the hernial sacs ranged from 5 to 9 cm. in length, thus reaching to about the middle between the internal ring and scrotum. An entirely open vaginal process was found in but 10 instances (6 per cent.).

Some of the signs that have been looked upon by other authors as proving the congenital nature of a hernia, and which have been confirmed by Hansen, are: thinness of wall, peculiar shape (finger of glove-shaped), as well as elasticity of the wall, in 60 per cent.; absence of any subserous fat in about 90 per cent.; folds, constrictions, cyst-formation, scar-like induration of the wall in 50 per cent.; strand-like appendices of the blind end, eleven times.

The most important sign of all, which was found in 87 per cent. of the cases, was the firm adhesions between the sac and the elements of the cord enveloping it.

On the whole, Hansen believes, with Bayer, that the splitting into fibers (*Auffaserung*) of the cord, is practically characteristic of a congenital hernia.

On the basis of observations made, Hansen feels inclined to draw the conclusion that the great majority of external inguinal herniæ in young adults with strong muscular development are due to a congenital sac, *i. e.*, a partial, or complete open vaginal process. Accepting as proof against the congenital character of a hernia a condition in which the sac lies alongside and independent of the cord, or is easily separated from it, showing layers of subserous fat, Hansen could consider as acquired only 26 (about 15 per cent.) in his entire series of 172 cases. This would give about 85 per cent. of congenital sacs. I thoroughly agree with Hansen, but would go even farther and put the percentage of congenital sacs higher, to include practically all cases of oblique inguinal hernia.

Hernia Duodenojejunalis Treitzii. Heller¹ reports a case of hernia duodenojejunalis Treitzii, cured by operation, which, in view of the rarity of this type of hernia, is worth briefly repeating.

The patient, a woman who had suffered for six months from symptoms of stenosis of the gut, came to the Greifswald Clinic in a condition of chronic ileus; vomiting occurred every twelve to twenty-four hours.

Examination showed the middle portion of the abdomen to be greatly distended, while the flanks were sunken in. The distention was caused by a tumor the size of a man's head, in which there were permanently visible and audible peristaltic movements. The probable diagnosis of peritoneal tuberculosis with kinking in the region of the upper loops of small intestine was made.

Upon broadly opening the abdomen, a smooth, spherical tumor presented, having the appearance of an ovarian cystoma. It was encircled by the large intestine (Fig. 8); no small intestine was visible. When the lower pole was lifted, the lowest loop of ileum was seen to protrude from a funnel-shaped indentation, passing through the wall of the tumor, as it were (Fig. 9). This loop was tightly adherent all

¹ Arch. f. klin. Chir., 1909, Band xc, Heft 2.

around the place of eventration, and, therefore, could not be pulled forward. The anterior wall of the sac was thereupon split in its entirety in the median line. Immediately the enormously dilated loops of intes-

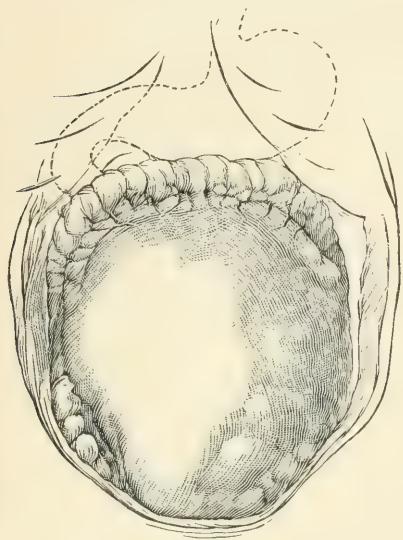


FIG. 8 .

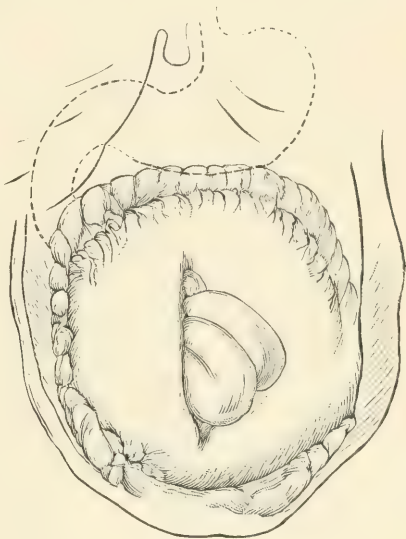


FIG. 9

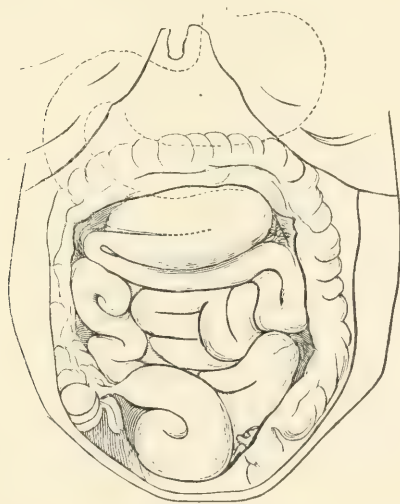


FIG. 10.—Schematic.

tine pressed forward. The entire mass of intestine was found to be intimately matted together and adherent to the sac. Blunt division was impossible. The condition found after loosening the intestines is well shown by Fig. 10. At the end of the operation the patient was in

a state of collapse. Two days later she had a second acute attack of collapse, which, upon partially opening the abdominal suture, was seen to be due to acute dilatation of the stomach. A Kader's fistula was placed in the still enormously distended ileum; from this a large amount of gas escaped, but no fluid; the fistula was closed on the fourth day.

Six months later the patient was presented before the Thirty-eighth Congress of the German Surgical Society, April 15, 1909. She had gained eighteen pounds in weight, and was entirely free from all digestive disturbance.

Heller states that, according to the location, form, and development, this hernia corresponds to the true herniæ duodenojejunalis of Treitz.

Heller found 15 cases of interperitoneal hernia reported in the literature, of which 8 were herniæ duodenojejunalis Treitzii (sinistra). Of these, 7 were cured, his own case being the 8th. The remaining 7 cases of intraperitoneal hernia, he states, undoubtedly belong to the type of hernia parajejunalis (dextra).

The Appendix as the Isolated Contents of the Sac in Incarcerated Herniæ.

C. Schnitzler,¹ in his paper on the appendix as the isolated contents of the sac in incarcerated hernia, states that it is not rare to find the appendix in conjunction with other viscera as the contents of the hernial sac. Wassiljew found this four times in 106 cases; Staatsmann, twenty-eight times in a series of 602 operations, while Clogg, who collected 3440 cases of hernia, mentions the appendix as hernial contents in sixty-five instances, or 1.9 per cent. In crural hernia, Christel found the appendix in 8 to 9 per cent. of the cases, while Hofmann observed it nine times (3.6 per cent.) in 250 inguinal herniæ, and Clogg, eight times in 100 cases of inguinal hernia in children.

However, the appendix alone is far more rarely known to form the hernial contents. According to Jaia, this was the case twenty-seven times in 1586 observations. Weyprecht noticed it six times in 402 cases; Wassiljew, once in 106 cases, and Verebely, once in 1000 cases, or 0.1 per cent.

Hansell, in 1903, published 4 cases of hernial incarceration of the appendix observed at v. Bruns' Clinic, to which he added 17 cases collected from the literature. Since then, Schnitzer states, 6 other cases have been observed at the Tübingen Clinic. All of these were, beyond doubt, cases of primary incarceration.

The *treatment* consisted in herniotomy plus appendectomy, and radical operation for the hernia. All of the cases made an uninterrupted recovery within from eleven to eighteen days.

Schnitzer collected 22 cases of true primary isolated hernial incarceration of the appendix, published since Hansell's statistics of 1903.

He states that Sonnenburg's view, that a hernial incarceration of the

appendix is to be attributed to a preceding appendicitis, is not borne out by any of the cases operated upon at the Tübingen Clinic.

With regard to the diagnosis, Schnitzer states that the clinical picture presented by an isolated incarceration of the appendix is usually materially different from that shown when the appendix plus other viscera are contained in the sac. Some of the symptoms are: sudden pain in the right inguinal, or crural region; sometimes colicky pain in the lower abdomen. A painful tumor becomes apparent in the inguinal region, or a hernia that previously caused no symptoms ceases to be reducible. General symptoms are often absent; slight rise of pulse and temperature. Vomiting was seen eight times in the 32 cases reported.

Schnitzer states, however, that it is as yet impossible to make a positive diagnosis on the basis of the clinical symptoms. The conditions that come into consideration as regards a differential diagnosis are omentoceles, Littre's hernia, appendicitis in the hernial sac.

Traumatic Herniæ. According to Schlender's¹ recent article, traumatic herniæ do occur. He believes: (1) That there are traumatic herniæ which appear only partially at the time of the accident, coming to completion later on. (2) That a gradual development of a hernia does not necessarily speak against its traumatic origin. (3) In every case of traumatic hernia there is evident some kind of bodily lesion, consisting in either injuries or incarcerations, or both. (4) Accident herniæ are based upon the presence of a congenital predisposition or pathological conditions. They are, therefore, not entitled to damages. (5) Only traumatic herniæ are entitled to damages. (6) The proof of the traumatic origin of a hernia is to be obtained by operation, if necessary.

Schlender holds that claims for a hernia should be granted only (1) if the presence of other diseases bars operation, or the pathological conditions are such as to render impossible a cure of the hernia by operation; (2) in cases of relapse; (3) in cases in which the traumatic origin of a hernia can be determined without operation; if the latter be refused, a truss should be furnished; (4) if, in view of local conditions, a useful truss cannot be made or endured by the patient.

Schlender points out the importance of Moro's experiments with regard to the behavior of the peritoneum under tension. According to the same, the elasticity of the peritoneum is so great that it can be made to cover more than double the normal area; and yet, after expansion of the peritoneum to its utmost capacity, it was seen to completely return to normal as soon as the pressure was released; and the pressure used in these experiments was considerably greater than any hitherto known to have been exerted upon the abdomen. This shows that no acute intra-abdominal pressure is capable of expanding the peritoneum beyond the point of its elasticity.

¹ Beitr. z. klin. Chir., 1910, Band lxxvi, Heft 3.

Hernia Obturatoria and Hernia Cruralis. Alfred Zinner,¹ of Vienna, in December, 1909, published an article "On the Knowledge of Hernia Obturatoria and Hernia Cruralis Prævascularis," in which he reported the following case, observed at the General Hospital of Vienna:

M. K., a female, aged forty-seven years, married, ten children, suffered from attacks of violent neuralgic pain in the right thigh since the menopause set in a year ago; the pain occurred always in the same place, and it always disappeared after a few hours without any medication. On January 23, 1908, she again had a typical attack, which, however, this time did not subside. Vomiting set in on the second day, and, as her attending physicians could not make a diagnosis, the patient was brought to the hospital on the third day, where she died half an hour later. The autopsy report gave the cause of death as paralysis of intestines due to incarceration of a partial enterocele in the right occluded orifice (*Hernia obturatoria dextra incarcerata*, Littré). Outside of this hernia, there were a double inguinal hernia and a labial hernia on the right side 6 cm. in length.

These obturator herniæ occur with far greater frequency in women than in men, the proportion, according to English, being 8 to 1, and the age at which they are most frequently observed is between forty and sixty years. Repeated pregnancy has been given as one of the principal causes for the development of this form of hernia.

As regards the diagnosis, English found that it was correctly made in but 25 of 107 cases; in sixty instances, the type of hernia was determined only at autopsy.

In the present case, Howship-Romberg's phenomenon, viz., neuralgic pains and cramps in the region of the obturator nerve, should have rendered the diagnosis easy.

As to a classification of these herniæ, Zinner accepts the anatomical differentiation established by v. Meyer, namely: (1) A hernia incompleta intracanal, when the hernial sac remains in the canal. (2) A complete hernia, when the sac passes the external opening of the canal.

He further differentiates:

1. A hernia obturatoria anterior, which follows the ramus superficialis of the nerve. As this ramus is the largest and most abundantly surrounded by fat, this form of obturator hernia is the most frequent. The hernial tumor then lies below the pectineus muscle.

2. The hernia accompanies the ramus posterior or profundus of the nervus obturatorius, hernia obturatoria posterior. If the sac is small, it reaches only to the upper border of the external obturator muscle; if the sac is larger, it protrudes between the upper and middle portions of this muscle and then also lies beneath the pectineus muscle.

¹ Deutsche Zeitschr. f. Chir., Band ciii, Heft 1.

3. The hernia remains between the two obturator membranes. This is the rarest form. In the case reported by Zinner, the hernia was a posterior obturator hernia. The accompanying drawings (Figs. 11, 12, 13 and 14) well show the conditions found at autopsy.



FIG. 11.—The pelvis from within. *H.cr.d.*, right crural hernia; *H.cr.s.*, left crura hernia; *H.i.d.*, right inguinal hernia; *H.o.*, obturator hernia.

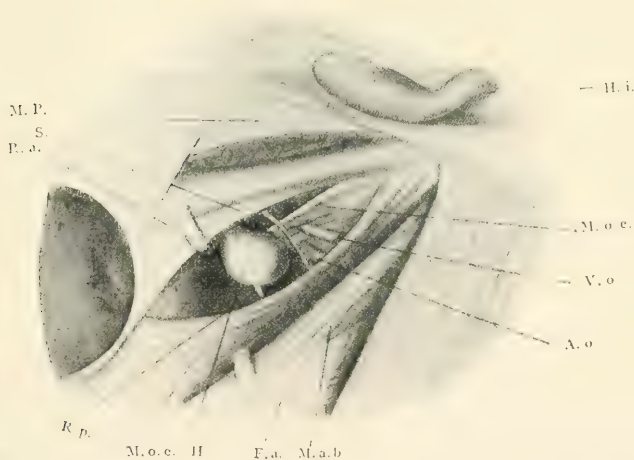


FIG. 12.—*M.P.*, pectineus muscle; *M.a.b.*, adductor brevis muscle; *M.o.c.*, external obturator muscle; *F.a.*, fascia of adductor brevis muscle; *M.o.e.*, external obturator membrane; *S.*, tendon band along the pubic bone; *A.o.*, obturator artery; *V.o.*, obturator vein; *R.a.*, anterior branch of obturator nerve; *R.p.*, posterior branch of obturator nerve; *H.*, hernia; *H.i.*, inguinal hernia.

This hernia very frequently occurs in conjunction with other herniæ, especially with crural herniæ. It has happened, therefore, that experi-

enced men have operated for crural hernia, and autopsy later showed a gangrenous loop in the obturator canal.

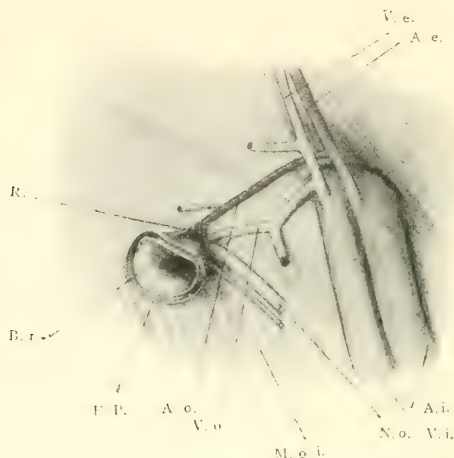


FIG. 13.—*B.r.*, neck of hernia; *FP*, funnel formed by the fascia of the pelvis; *A.i.*, external iliac artery; *V.i.*, external iliac vein; *A.e.*, inferior epigastric artery; *V.e.*, inferior epigastric vein; *A.o.*, obturator artery; *V.o.*, obturator vein; *R.*, ramus muscularis of the obturator artery; *M.o.i.*, interna obturator muscle; *N.o.*, obturator nerve.

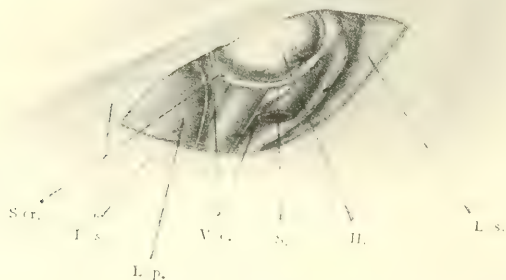


FIG. 14.—*H.*, hernia; *F.s.*, superficial fascia; *L.s.*, lamina superficialis of the fasciæ latæ; *L.p.*, lamina profunda of the fasciæ latæ; *S.*, septum vaginæ vasorum; *S.cr.*, septum crurale Cloqueti (partly dissected and drawn away with a hook); *V.c.*, vagina vasorum communis (opened).

In view of the fact that obturator herniæ but seldom show a palpable tumor, and that, in most cases of incarceration of an obturator hernia, partial enteroceles are present, and it is therefore difficult, on account of the narrowness of the hernial opening, to properly investigate the fixed loop of intestine when exposing the sac, Zinner states that the

operation of choice should be laparotomy in all cases in which there is any suspicion of the presence of an incarcerated obturator hernia.

Herniotomy without Preceding Taxis. A strong argument in favor of herniotomy without preceding taxis is offered by J. van Assen,¹ Assistant to the Surgical Clinic at Amsterdam.

He reports 100 cases operated upon at the Amsterdam Clinic between the years 1903 and 1906; in none of these cases was taxis employed.

The types of hernia were: 33 inguinal (27 men, 6 women); 60 crural (8 men, 52 women); 4 umbilical (all women); 1 epigastric (a woman).

In addition, there was one case of hydrocele in the female in which the general symptoms had called forth the diagnosis of incarcerated hernia, and one case of adipocele which had also been taken for an incarcerated hernia.

As to the contents of the sac, the omentum alone was found in 22 cases; small intestine and omentum in 12 cases; small intestine alone, thirty times; eight times a partial enterocele was found; eight times the appendix was contained in the sac, once in addition to the small intestine and once with the cecum; five times the appendix was inflamed, and three times it was involved in retrograde incarceration; once it was entirely obliterated. Some portion of the gut was contained in the sac in 63 instances. Only two fatalities are recorded; one of these, v. Assen states, would have died also if taxis had been attempted, but no physician would have dared this in the patient's condition. In the second fatal case it is very doubtful whether the patient, who was eighty-one years of age, would have survived taxis had this been resorted to.

These results, it must be admitted, speak well for operative treatment in all cases of incarceration. Schede's series, covering cases treated partly by taxis and partly by herniotomy, show a mortality of 24 per cent. The statistics of Mikulicz and Czerny's Clinics show a mortality of 11.34 per cent. and 11 per cent. respectively. Van Assen states, however, that it would not be fair to compare these statistics with that of the Amsterdam Clinic, since, in the latter, nearly all patients were operated upon at an early date; 30 of these cases were admitted to the Clinic on the very day on which the first signs of incarceration had been noted; 17 on the second day, and 10 on the third day; still, considering that 4 of the cases were below one year (one was six days old), 18 were between sixty and seventy, 17 between seventy and eighty, and 3 were above eighty years, it must be conceded that many of the cases certainly did not look particularly promising for operation.

As regards *wound healing*, v. Assen states that in the great majority of the cases the wound healed by primary union; drainage was employed seven times. Inhalation narcosis was used in 32 of the cases, local anesthesia in 62.

¹ Beitr. z. klin. Chir., 1909, Band lxxv, Heft 2.

Van Assen's conclusions are:

1. That every case of incarcerated hernia should be operated upon as soon as possible, without any preceding attempts at taxis, since the latter is not always free from danger even during the first hours, and it is impossible to determine this beforehand, while the results of operation are nearly ideal. However, in cases of florid lues and infection of the field of operation, it may be advisable to first use taxis, provided there are no contraindications. In small children, if no alarming symptoms are present, elevation of the pelvis may be tried to see if spontaneous reduction will take place.

2. Incarcerated hernia should generally be operated upon under local anesthesia.

These statistics certainly prove, beyond any reasonable doubt, that taxis should be entirely abandoned in the treatment of strangulated hernia, provided that operative treatment in skilful hands is immediately obtainable.

Hernias of the Omental Bursa with Abnormal Openings. Schumacher,¹ of Krönlein's Clinic, at Zürich, publishes an exhaustive study on the subject of "The Hernias of the Omental Bursa with Abnormal Openings. The *Transhæsiö Intestini*." In his anatomical description, he states that the normal entrance to the omental bursa is through the foramen epiploicum and the vestibulum. Jeanbrau and Riche, in 1906, found 21 cases mentioned in the literature in which, owing to the intrusion of loops of intestine into the peritoneal sac by this route, a so-called hernia of the foramen of Winslow had been formed.

Schumacher explains that by abnormal openings into the peritoneal sac, he means every interstice in its wall which permits of the intrusion of viscera. Such openings can thus be found:

1. In the omentum minus.
2. In the lamellæ of the omentum majus, and here (*a*) in the ligamentum gastrocolicum; (*b*) in the *paros libera* of the omentum majus.
3. In the transverse mesocolon.
4. In the parietal peritoneum of the posterior wall.

In order to render possible the intrusion of gut into the peritoneal sac in these cases, a retroperitoneal hernia must have preceded.

I. OPENINGS IN THE MINOR OMENTUM. Schumacher states that he could not find a single case in the literature in which loops of intestine had passed through a defect in the minor omentum into the vestibulum and omental bursa.

As regards preformed lacunæ in the small omentum, he is not aware of any definite data concerning such in the anatomical literature; he has no doubt that resorption orifices may occur in the *pars flaccida lig. hepato-gastrici*. These do not, however, seem to be as frequent as; for instance, Buy believes, who states that in the adult the small omentum

¹ Beitr. z. klin. Chir., 1910, Band xvi, Heft 3.

usually has "windows." In 100 autopsies (10 newborn infants, 23 children up to thirteen years of age, and 67 adults), only two such preformed apertures were found. Such lacunæ in the small omentum, however, seem to develop more frequently in the presence of pathological conditions. All the difficulties arising from topographical anatomical conditions to the passage of a gut into the foramen of Winslow militate in about the same measure against their entrance through a defect in the small omentum. The principal difficulties are found in its high and hidden position. The barrier of the mesocolon and transverse colon, and, by no means least, the normally formed and situated large omentum, render difficult any ascension on the part of the small intestine. Favorable conditions would be: High location of the transverse colon, abnormal motility of the large and small intestine, defective development, transposition of, or pathological changes in, the epiploön.

II. POINTS OF ENTRANCE INTO THE MAJOR OMENTUM. Schumacher details autopsy and operative records of the cases he found reported, which are briefly as follows:

Case 1 (Baugrand). Lacuna in major omentum; entrance from ileum between laminae of omentum; ileus; death.

Case 2 (Hilgenreiner). Aperture in posterior lamina of major omentum; entrance of loop of intestine between blades of omentum; incarceration; operation; cure.

Case 3 (Wandel). Mesenterium commune; repeated volvulus of cecum and ascending colon, finally fatal. Large fissure in anterior lamina of large omentum; entrance of small intestine into the large omentum.

III. HERNIAL PASSAGE INTO TRANSVERSE MESOCOLON.

IV. HERNIAL ENTRANCE INTO PARIETAL PERITONEUM. Schumacher states that a study of the reported cases has shown it difficult to keep these two categories separate. Defects in the transverse mesocolon, or apertures at its radix are rare observations. Treitz found but two true apertures in the mesentery in many thousands of cadavers. Schumacher was able to collect 21 positive cases of defect in the transverse mesocolon or its radix; to these he adds one personal observation, which, counting a somewhat doubtful case of Boyd's, makes a total of 23 cases. In 19 of these cases, loops of intestine had either positively, or in all probability, passed through the opening into the omental bursa. Schumacher points out the frequent combination of chronic ulcer of stomach and a defect in the transverse mesocolon. He found this in 14 of the 23 cases collected by him. He further states that the entrance of gut into the omental bursa may occur after rupture of the walls of the hernial sac in certain retroperitoneal herniæ.

In speaking of the relationship between lacuna formation in the transverse mesocolon (and lesser omentum) and volvulus of the stomach, he states that, of 15 cases of total or partial volvulus of the stomach, 4

cases showed a transposition of the gut in such a way that loops of intestine had entered the omental bursa minor and had passed out again through the minor omentum. A defect in the transverse mesocolon is mentioned as the place of entrance in three instances.

As regards *diagnosis*, Schumacher states that in none of the cases was the correct diagnosis as regards transposition of the gut made before autopsy *in viro sive mortuo*. In the presence of symptoms of acute ileus, it is possible, in view of the history of the case and the clinical symptoms, to obtain some clue as to the height of the intestinal occlusion and its mechanism. This, however, is all that can be said beforehand in the cases of hernia bursa omentalis with abnormal points of entrance.

Appendicitis within the Hernial Sac is the subject of a paper by Franz Barsickow.¹ He reports 5 such cases observed at the Tübingen Clinic from 1897 to 1909. Two of the cases were inguinal herniæ in men, that had existed ten and twenty-five years respectively; the other three, crural herniæ in women.

Pronounced symptoms were not observed in any of the cases; the patients' general condition was slightly impaired; the temperature ranged between 99.5° and 101°; in two instances, there was some vomiting, but this was not fecal in character; there was some constipation; no abdominal tenderness; the hernias had the appearance of tumors from the size of an apple to a man's head; sensitiveness to touch and pressure was rather pronounced in some cases; the skin over the tumor never showed edema or infiltration.

Owing to this absence of any pronounced characteristic symptoms, the diagnosis was not made before operation in any case. Anatomical findings left no doubt that the appendicitis was primary in every instance.

To the 5 cases observed at v. Bruns' Clinic, Barsickow adds 39 cases collected from the literature, making a total of 44 cases of appendicitis within the hernial sac; 30 of these were inguinal, and 14 crural herniæ. Of the former, 21 were men, 3 women, and 6 boys. Of the crural cases, 13 were female, 1 male.

In 15, or 50 per cent., of the cases of inguinal hernia, the processus vermiformis alone was found in the sac; in the other 15 there was some portion of the intestines, in addition to the appendix. The appendix alone was present in 11 of the crural herniæ, and appendix plus intestine in 3.

With regard to the ages:

- 6, or 13.6 per cent., were below 10 years.
- 3, or 6.8 per cent., were between 11 and 30 years.
- 7, or 15.9 per cent., were between 31 and 40 years.
- 4, or 9.1 per cent., were between 41 and 50 years.
- 13, or 29.5 per cent., were between 51 and 60 years.
- 5, or 11.4 per cent., were between 61 and 70 years.
- 5, or 11.4 per cent., were between 71 and 80 years
- 1, age not given.

¹ Beitr. z. klin. Chir., May, 1910.

Barsickow states it is not remarkable that "hernia-appendicitis" occurs in early childhood. Wernher found that in the male the greatest number of inguinal herniæ occur during the first year of life. According to Selter, appendicitis occurs seven times as often in children as in adults.

The high percentage of cases occurring in persons of advanced years is explained by the fact that in these the appendix is found most frequently as the hernial contents. In 85 cases of hernia of the process vermiformis, Levy found 20 each to have occurred in the sixth and seventh decade.

The prognosis of "hernia appendicitis," generally speaking, is favorable. In the 44 cases reported by Barsickow, there were 4 deaths, *i. e.*, 2 from pneumonia, and 2 from peritonitis.

As regards *therapy*, Barsickow states that whenever there is suspicion of unusual contents of the sac, especially when a "hernia appendicitis" cannot be positively excluded, taxis should never be attempted. Sprengel recommends, in addition to herniotomy, opening of the abdominal cavity from above, through another incision; he then grasps the appendix at its base and pulls it out through the hernial canal. Barsickow holds that, in view of the possibility of infection of the field of operation through tearing of the appendix, a method which permits of keeping the appendix before one's eyes must be considered as more rational. He believes that if, after herniotomy, it is found that the hernial opening is too narrow to permit of pulling out the cecum, the incision should be lengthened sufficiently to allow of easy access to the insertion of the appendix. He states that this method has been performed in many of the cases operated upon at v. Bruns' Clinic. After typical resection of the appendix, the radical operation for hernia is added. His conclusions are:

1. Only in the rarest instances is it possible, from the clinical picture of an appendicitis within the hernial sac, to render even a probable diagnosis.

2. If a hernia suddenly shows slight signs of incarceration, and the tumor and surrounding tissues present the appearance of inflammation, and if there be slight fever, with or without temporary retention of stools, appendicitis within the hernial sac should be thought of.

3. In cases in which the appendix forms the only contents of the sac, and the same has either undergone pronounced changes or become totally destroyed, it is often doubtful whether one is viewing the end result of an inflammation or incarceration.

4. If taxis has not been employed, the prognosis is good.

Permanent Results of Operation for Epigastric Hernia. Capelle,¹ of Küttner's Surgical Clinic, Breslau, writes on the subject of the permanent

¹ Beitr. z. klin. Chir., 1909, Band lxi, Heft 2

results of operation for epigastric hernia. He states that, according to reports from Surgical Clinics, epigastric hernia is a relatively rare form of rupture, it being said that only 1 or 2 per cent. of all herniæ occur above the umbilicus in the linea alba. This, however, he points out, is by no means a correct proportion of the actual frequency of these herniæ, since they often exist unnoticed.

Friedrich and Bohland, who systematically examined every patient who presented himself at the clinic, found 33 herniæ of the linea alba in 15,500 and 3420 respectively, being equal to an absolute frequency of 0.6 and 1 per cent. respectively.

Capelle reports 48 cases operated upon at the Breslau Clinic, 35 of which were traced to late results. The plan of operation was limited strictly to the cure of the hernia, as is shown by the fact that in 21 of the 48 cases the peritoneum remained closed; in 7 others the peritoneum was opened accidentally rather than on purpose, and it was opened only so far as was necessary to eliminate the peritoneal funnel that had been drawn out. Only in 8 instances was the peritoneum opened with the definite intention of looking for adhesions; in 10 cases, an exploratory laparotomy was done. This conservative procedure is identical with that practised by Kocher, Witzel, Champi-onnière, Rydygier and others.

Capelle believes, however, on the basis of the results obtained, that a simple hernia operation is insufficient, if not absolutely useless, in all cases of hernia in the linea alba that are in any way complicated with stomach symptoms, and would invariably add an exploratory laparotomy in such cases, holding that in many patients the epigastric hernia is merely a veil hiding other processes, even in the absence of clinical signs.

With regard to the immediate results, Capelle states that 30 patients left the hospital after from two to three weeks, with a firm scar and entirely relieved of all former symptoms. In 9 others, while the scar was absolutely firm, there was still some sensitiveness upon pressure, or pain in the region of the scar. Of the remaining 9 cases, no careful records were taken upon their departure from the hospital. Thirty-six cases were traced from six months to eight years. Of these, the result remained ideal in 9; 19 complained of more or less trouble, although in 13 the anatomical result was perfect, while in the remaining 6, a recurrence had taken place.

As regards the subjective symptoms in the cases with anatomically perfect result, it is stated that 5 complained of digestive disturbances of various kinds; others experienced sensations of discomfort and pain upon bodily exertion.

In view of the rather high percentage of recurrences, nearly 12 per cent., Capelle states they have come to the conclusion that the small linear suture of the fissure in the fascia, as employed at the clinic, does not represent a very safe method of closure, and he states that

they have decided to adopt a method similar to that of Menge-Graser, who use a plastic operation for the closure of the hernial deficiency.

Ruptures of the Gut due to Taxis. F. Sängers¹ states that not less than five ruptures of the gut, due to taxis, have been observed in a series of 165 cases of incarcerated hernia operated upon within the last three and one-half years at v. Bruns' Clinic. The injury done in these 5 cases resulted in more or less extensive peritonitis, to which 3 of the patients succumbed, while 2 could be saved by resection of 7 and 130 cm. of gut respectively, irrigation, and drainage. Sängers adds the histories of 35 cases of rupture due to taxis which he collected from the literature. Of 23 cases in which the sex is stated, 14, or 60.9 per cent., were women, and 9, or 39.1 per cent., men.

As regards the variety of hernia, it is stated that, of 29 cases, 20, or 69 per cent., were femoral, and 9, or 31 per cent., inguinal hernia.

In the majority of the cases, the hernia had existed for a number of years, although in one instance, a man, aged seventy-five years, it had been present since childhood.

All of the cases not operated upon died of peritonitis. Of those operated upon, 22 in number, 10, or 45 per cent., recovered; 12, or 55 per cent., died. In all, with the exception of one, peritonitis was present at the time of operation.

As regards *therapy*, it appears that in the 10 cases which recovered, resection of the gut, to the extent of from 7 to 130 cm., was done four times, and that within eight, nineteen, twenty-four, and seventy-two hours after beginning incarceration, and seven, fourteen, twenty, and twenty-four hours after attempted taxis. In the other 6 cases, the operation consisted in closure of the perforation by suture, done from five to seventy-two hours after incarceration, and from four to sixty hours after taxis. In the cases that succumbed to operation, herniotomy was done twice, twenty-four and forty-eight hours after incarceration, and the perforation was found only at autopsy; in 8 cases, a herniolaparotomy was done, and in two instances the procedure is not stated.

The prognosis as regards recovery is better the sooner the source of the possible infection is found and stopped. Sängers believes that it may be said without exaggeration that, in the majority of the reduction maneuvers, some of the small vessels are ruptured or contused, resulting in injury to the wall of the gut, and, in the event of operation, interfere with wound healing. He further calls attention to the damage that may be done in cases of doubtful diagnosis, as well as in the instances in which an obstruction, in the shape of a gallstone, fecal concretion, mesenteric cyst, etc., renders reduction impossible from the start. He condemns taxis as dangerous manipulation, a working in the dark.

Frequency of Abdominal Herniæ following Appendicitis Operations. The subject of the frequency of abdominal herniæ following appendicitis

¹ Beitr. z. klin. Chir., May, 1910, Band lxxviii, Heft 1.

operations, especially after abscesses treated by suture, is discussed at some length by Max v. Brunn,¹ of v. Bruns' Surgical Clinic.

Of 307 operations performed for appendicitis between April 1, 1904, and October 1, 1908, 147 were requested to return to the clinic for re-examination. Of these, 96 responded, and 4 others sent replies through their family physicians. Von Brunn's observations are, therefore based upon 96 personal observations and 4 by other physicians. He appends the histories of the cases. A survey of the results shows the following: No disability, or at least only such as had positively no connection with the appendicitis or the operation, 62 cases; minor or temporary disability, 29; subsequent suppuration, 8 cases; permanent disability, 1 case. 67 cases showed a perfectly sound scar; of these, an interval operation was done in 29, an early operation in 9; abscess operation in 24; peritonitis in 9.

In all but 4 of these 67 cases of open wound treatment, layer suture, either alone or with 1 or 2 drains, was employed.

In 14 cases the scar was somewhat thin, although no hernia could be made out. A pronounced hernia, varying from the size of a pea to a very large size, was found in 19 cases. Of these, one occurred after an interval operation, 15 after operation for abscess, and 3 after peritonitis; with the exception of two herniæ, one the size of a pea, the other the size of a small olive, all were reducible.

The contents, in the majority of the cases, was omentum. Von Brunn's tables show that:

	Per cent.
Lennander's incision was done 86 times, with 10 herniæ	11.63
Paracecal incision was done 3 times, with 1 hernia	33.33
Intracæcal incision was done 4 times, with 1 hernia	25.00
Oblique incision was done 8 times, with 6 herniæ	75.00
Median incision was done 4 times, with 2 herniæ	50.00

Of 16 cases with open wound treatment, 11, or 68.75 per cent., developed a hernia (7 small, 4 large). Of 89 cases treated with suture, 10, or 11.24 per cent., developed a hernia, (6 small, 4 large).

Excluding the completely sutured cases, in none of which a hernia was observed after operation, and considering only the cases in which there was more or less infection of the wound, there were 10 herniæ in a total of 54 cases, or 18.52 per cent.

As regards the incision, especially as to estimating the value of the oblique incision as compared to Lennander's, v. Brunn explains that all cases in which an oblique incision was made received open wound treatment, while of those in which Lennander's incision was used, only three were treated openly, and of the latter, one developed a hernia.

Von Brunn's material, therefore, shows the superiority of suture over open wound treatment, but does not prove any inferiority of the

¹ Beiträge z. klin. Chir., May, 1910

oblique incision as compared to Lennander's, although v. Brunn considers the latter an excellent method, inasmuch as in none of the cases in which conditions permitted of complete closure of the wound was a hernia later observed.

In conclusion, v. Brunn states that a causal relationship between a disposition to hernia and the appearance of a cicatricial hernia does not exist. That the scars, in no small proportion of the cases, have successfully withstood the demands made upon them by pregnancy and childbirth, speaks well for the character of the scars following Lennander's incision.

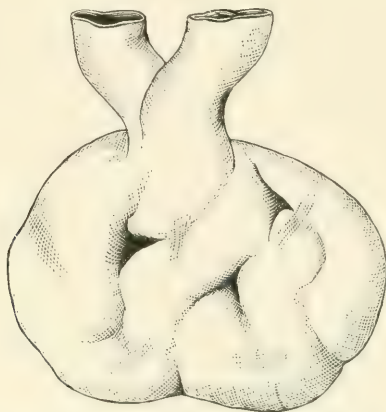


FIG. 15.—Diagram of the bowel mass which had been long present in the hernial sac, was covered by omentum, and was not strangulated.

Double-loop Femoral Hernia. John A. C. Macewen¹ reports a case of double loop left femoral hernia, observed at the Glasgow Royal Infirmary.

The patient was a man, aged sixty-six years, who came to the Infirmary on December 14, 1909, with symptoms of intestinal obstruction. Five days before, the patient had had a sudden attack of pain in the umbilical region, which recurred the following day and became constant on the third day. The probable diagnosis of a large femoral hernia, containing strangulated bowel, was made. Incision over the tumor revealed two sacs, one within the other, but perfectly free from each other. Upon widely opening up the sacs, a loop of dark, bluish-purple, congested and distended small intestine, about one foot in length, presented and was brought out through the wound. The portions of this strangulated loop which had been opposite the neck of the sac had seemingly not suffered greatly from pressure, and the loop, apparently consisting of ileum, was returned to the abdomen with little difficulty (Fig. 15). The remaining mass was found to consist of two

¹ British Medical Journal, April 2, 1910.

distinct portions, one of which was a large coiled mass of congested omentum, which, upon being disentangled, proved to be ten inches long, six inches broad, and one-quarter inch thick. The second portion of the mass, the size of an orange, was seen to consist of bowel, the surface of which was covered with a number of small pockets, apparently representing positions where the original coils of which the mass was composed had not fused as they had elsewhere. Some fibrous adhesions were present between the various loops, as shown on the accompanying diagram. As the intestinal obstruction was clearly due to the first strangulated loop, reduction of the mass was decided upon and easily accomplished in view of the large size of the crural opening. The patient made an uninterrupted recovery, and has remained well since.

Macewen believes that the loop became strangulated immediately upon its entrance into the sac five days previously. The theory advanced in explanation of the formation of these hernia, that a single large loop of bowel comes down into the sac, and that subsequently the central portion of the loop slips back into the abdomen, Macewen states does not apply in his case, in which it was evident that one loop had been constantly present in the sac for many years, while the other loop had equally certainly been present only a short time.

Macewen refers to a case of strangulated umbilical hernia containing loops of bowel, reported by Benno Schmidt, in 1880, but states that Lauenstein first drew general attention to the subject of double-loop hernia. The latter, in 1894, reported a case of strangulated inguinal hernia containing two loops; in 1905 and 1909 he published series of cases of this type of hernia.

With exception of Benno Schmidt's case, and five others which occurred in the crural region, all were inguinal herniæ, and, in all, both loops of bowel were strangulated, while Macewen's case was a left femoral hernia with but one of the loops strangulated.

Separation of the Mesentery at its Insertion in Cases of Strangulated Hernia. Rabère and Charbonnel¹ have published a very interesting paper upon the separation of the mesentery at its insertion in cases of strangulated hernia. They call attention to the fact that lesions upon the mesentery have not received the consideration they deserve. Nicaise, Dupuy, and Motte, in their respective works, have given careful study to these different alterations. Rabère² observed one case of spontaneous detachment of the mesentery at its insertion in a woman, aged fifty-nine years, operated upon for strangulated crural hernia; 15 cm. of black, congested intestine presented, from which the mesentery had been torn. He resected 40 cm. of the gut, and did an end-to-side anastomosis, according to v. Eiselsberg. The patient made a good recovery.

¹ Rev. de Chir., October, 1910, p. 877.

² Gaz. hebdomadaire des sciences médicales de Bordeaux, July 18, 1909.

Rabère made a careful search of the literature, and found but two other cases, just like his own, one by Colle, of Lille, the other by Dujon, of Moulins. Colle's¹ case was a man, aged twenty-two years, in whom operation was done ten and one-half hours after strangulation; moderately forcible taxis had been applied for four minutes before operation; a large loop of bowel was found, from which the mesentery was completely torn. Resection of 60 cm. of intestine; the patient recovered.

Dujon² reported a case, a male, aged fifty-four years, in whom the hernia had become strangulated twenty-four hours before operation; moderately forcible taxis had first been applied; a coil of strangulated intestine, 40 cm. in length was found, without any trace of mesentery. The patient succumbed within twenty-four hours after operation.

Rabère and Charbonnel attempt to explain the mechanism of the accident in the three observations reported; they think that in no case had taxis been unduly prolonged or more forcible than ordinary.

According to Colle, while the strangulation is being produced, there is a sort of conflict going on between the hernial intestine and its mesentery. The overdistention of the former by gas, with the non-distensibility of the mesentery in a way opposing this increase of volume, causing the mesentery to tear away from the intestine.

This explanation appears satisfactory to the writers. On the other hand, it does not exclude the possibility that other adjuvant causes may come into consideration, *e. g.*, extensive dimensions of the hernial sac, to which Colle alludes, and an abnormal friability of the mesentery resulting from various pathological causes. The capacity of the hernial sac, in general, places a limit upon the tearing of the viscera. In conclusion, they state that the separation of the mesentery at the level of the intestine, in cases of strangulated hernia, appears to result from a purely mechanical cause, true traction, whether due to the dimensions of the sac, or the friability of the mesentery.

Resection of the intestine, of course, is the only operative measure to be considered in these cases.

From the *Annual Report of the Heidelberg Surgical Clinic* for 1909, it appears that the total number of herniæ observed during the year was 476 in 418 patients, 347 male and 71 female; 455 herniæ were operated upon, with 13 deaths, or a mortality of 2.9 per cent.

Three-hundred and thirty-four operations were done for inguinal hernia, with 7 deaths; 55 for femoral, with 5 deaths; 20 umbilical and 15 epigastric herniæ, without mortality; 28 ventral hernia operations, with 1 death; 1 hernia pubica traumatica, 1 incarcerated obturator hernia, and 1 congenital lateral ventral hernia, the latter 3 without death.

¹ Presse médicale, October 3, 1896, No. 81.

² Annales médico-chirurgicales du Centre, December 22, 1907.

Retroperitoneal Hernia. Matthews¹ reports one original case of retroperitoneal hernia of the pericecal type, and seven other cases collected from the literature. He concludes:

1. That pericecal retroperitoneal hernia is a very rare condition, as shown by the fact that to date only 15 authentic cases have been reported, 8, including the author's, being of the subcecal, and 7 of the ileocecal variety.

2. *Mortality.* In the reported cases of ileocecal variety, one (Tuffier's) apparently gave rise to no symptoms. The postmortem findings would indicate that the bowel entered and left the sac without difficulty. The second case was discovered in the Musée Dupuytren. No symptomatology was obtainable. In the remaining 5 cases, 2 recovered (Riese and Macewen's cases); mortality, 60 per cent. There were 5 deaths in 8 cases of the subcecal type, giving a mortality of 62.5 per cent.; making an average of the two varieties of 61.25 per cent.

3. *Symptomatology.* Though the description of symptoms in many cases is inadequate, it is quite likely that there are few, if any, features pointing to a differential diagnosis. Symptoms of acute, or possibly subacute, intestinal obstruction, will obtain in practically all cases.

4. *Sex.* Stated in 5 cases, 4 males and 1 female.

5. *Treatment.* The therapeutics must necessarily be based upon the general principles of abdominal surgery.

¹ Annals of Surgery, May, 1910.

SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA

BY ARPAD G. GERSTER, M.D.

Röntgen Rays in the Diagnosis of Abdominal Conditions. Recent advances have been so marked in the Röntgen diagnosis of diseases of the stomach and intestines that they deserve mention.

TECHNIQUE. Bismuth subnitrate, the substance first used in demonstrating the outlines of various portions of the gastro-intestinal tract, has been wholly supplanted by bismuth subcarbonate. The nitrate was found to be dangerous. A number of cases of poisoning were reported—in several instances terminating fatally in children. The symptoms were those of nitrate poisoning. Investigation showed that bismuth was being excreted by the kidneys, and that the presence of methemoglobin could be demonstrated by spectroscopic examination of the blood, even in cases which gave no signs of toxemia. Unlike the nitrate, bismuth carbonate was found to be neither poisonous nor constipating.

The "bismuth meal," of Rieder, consists of 400 grams of some sort of "pap," plus 40 to 100 grams of bismuth subcarbonate. Groedel¹ makes this up as follows: The bismuth is carefully rubbed up with milk; raspberry jelly is added, and the whole is made up to 400 grams with lukewarm broth. This broth, or "pap," consists of water and ordinary flour, or rice flour, boiled together. Farina, bread and milk, or mashed potatoes have also been used. The object of this mixture is (1) to cause as large a shadow as possible, using a minimum amount of bismuth, and (2) to prevent sedimentation of the bismuth. Groedel says: "The patient must be absolutely fasting, and no fluid whatever must be taken for at least two hours before the examination. The broth must be taken fairly hot. With these precautions, I never get any sediment." The patient should be in the upright position for x-ray examinations of the stomach, though it is better for him to lie on his back when it is desirable to determine in which portion of the intestine the bismuth meal is lying.

According to Groedel,² Röntgenoscopy observation, by means of

¹ Archives of the Röntgen Ray, July, 1910, No. 120, p. 51.

² Ibid., September, 1910, No. 122, p. 156.

the fluoroscopic screen, usually suffices to establish the diagnosis. "Röntgenography—*i. e.*, the taking of a photograph—is only necessary for insuring a correct diagnosis in doubtful cases."

THE NORMAL FORM OF THE STOMACH, as shown by the *x*-rays, is entirely different from that seen in text-books on anatomy, or at operation when the patient is in deep narcosis. This has been described by various authors as siphon-shaped, or "J"-shaped, or like a bull's horn (Holzknecht). The Röntgen picture of a normal stomach containing a Rieder bismuth meal is seen in Fig. 16, and its key, Fig. 17.



FIG. 16.—Normal stomach of a woman. (Groedel.)

The empty stomach, a flabby folded tube, cannot be demonstrated by means of the *x*-rays. Only the "magenblase" (literally, "stomach bladder" in German) can be seen. This is an accumulation of gas usually observed just under the left diaphragm at the highest point of the stomach. "If one watches the stomach while a meal is being taken, one sees the first bits of food appear as dark shadows at the lower margin of this magenblase which is seen as a bright disk. These bits of food stay there only a short while and then glide slowly down

between the apposed walls of the stomach. The following quantities of food move more quickly, and an accumulation forms at the bottom of the stomach." "A normal stomach will be completely and uniformly filled up to the magenblase by a normal bismuth meal of 400 grams" (Groedel). "The stomach hangs loosely between the cardiac end and the pylorus, and is bedded on the small intestines. The form of the stomach is the result of the combined pressure of the surrounding organs and the gravitation of the food. Were the stomach a loose atonic sac, the ingesta would collect in a mass at the bottom. The

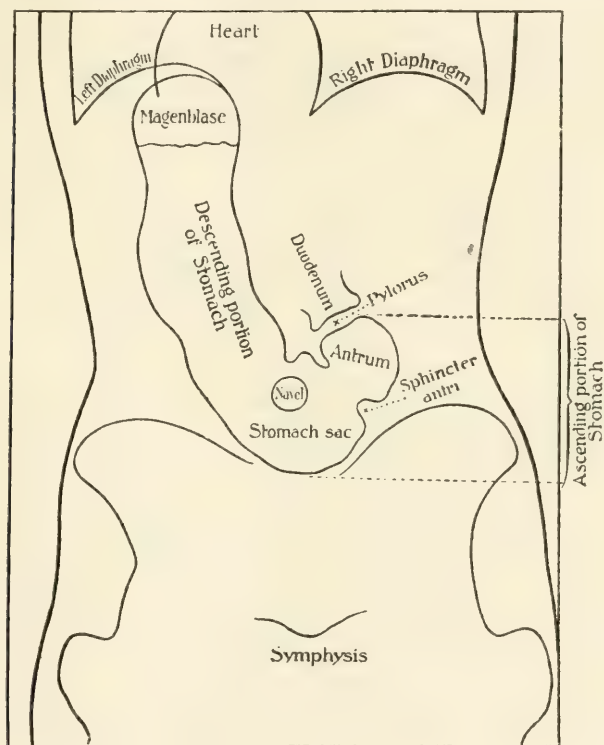


FIG. 17

normal tone of the muscular walls prevents this, and hence we see that the bismuth meal fills the stomach in a uniform way to the highest point."

Before the differences between normal and abnormal peristalsis can be established, more observations must be made both by Röntgenoscopy and by means of Röntgenkinematography. Although the latter is scarcely beyond the experimental stage, its future gives great promise. At present, however, even those most familiar with its use state that they are not yet ready to draw positive conclusions about

the various differences in peristalsis which come to their notice. For example, the interpretations of the actual movements, as seen at the antrum pylori by experienced observers, are still the subject of controversy.

A glance at Fig. 18 shows a series of superimposed outlines of a single cycle of the digesting stomach. These were taken from a series of Röntgenkinematographs. They show the pyloric portion, more especially the antrum pylori, to be most active, while the fundus or magenblase takes little, if any, part in the peristalsis. There is no question about this; it confirms, in the main, previous views regarding gastric motility.



FIG. 18.—Superimposed outline of a single cycle of the digesting stomach. (Kaestle, Rieder, and Rosenthal.)

The normal stomach becomes empty from two to six hours after a bismuth meal. The normal time for the ingesta to consume in passing through the small bowel is about four or four and one-half hours (Hertz¹). Two hours more are required to reach the hepatic flexure, and two more to reach the left iliac region.

THE INFLUENCE OF POSTURE ON GASTRIC MOTILITY. Markovic and Perussia² proved that posture has a great influence in accelerating or retarding the passage of food from the stomach. Their procedure

¹ Archives of Röntgen Ray, September, 1910, No. 122, p. 158.

² Med. Klinik., 1910, p. 542.

was as follows: A healthy person was given a bismuth meal of about 300 grams, and was then kept lying on his left side. Röntgen observations were made from time to time. On the following day the same process was repeated, with the subject lying upon the right side. Results showed that it required six to seven hours for the stomach to empty itself with the subject lying upon the left side, while three to three and one-half hours sufficed to accomplish the same result upon the right side. Their observations upon abnormal stomachs have caused them to arrive at the following conclusions:

Unusual rapidity in emptying the stomach can be due to increased muscular power, or to a lessened resistance at the outlet—pyloric insufficiency. Pyloric insufficiency is indicated by a greater difference between the periods of time required for a stomach to become empty in the two positions, principally due to a more rapid emptying of contents in the right-sided position.

A lessened difference in the time of the two sides, chiefly due to a rapid expulsion of contents when upon the left side, speaks for increased muscular power, causing hypermotility.

With motor insufficiency due to atony, much more time is required in the left-sided position, because here the organ, with lessened muscular power, works at the greatest disadvantage.

In beginning pyloric stenosis, the lengthening of time for either side is but very slight, for at first muscular power is increased, and consequently functionates well even in the left-sided position, while the obstruction at the outlet is the same in any position.

THE ACT OF VOMITING UPON THE RÖNTGEN SCREEN. Observations of Levy-Dorn and Mühlfelder¹ indicate that the stomach, during the act of vomiting, is not only drawn upward by external impulses, but also contracts strongly upon its contents from all sides. The diaphragm at the beginning of the act is in the inspiratory position; later, in the expiratory, as seen in the normal drawing in of the belly wall.

DISPLACEMENTS OF THE STOMACH can be determined with greater ease and certainty by the x rays than by any other means excepting exploratory laparotomy.

There is no such thing as gastroptosis; the condition is a pyloroptosis, usually the result of longitudinal stretching from overloading. "This may be recognized by an increase in length and a decrease in cross-section of the body of the stomach, and by the smallness of the magenblase. This is incorrectly described as gastroptosis, on account of the depth to which the stomach sac descends" (Groedel).

By transverse illumination, which is technically very difficult, the magenblase can be seen lying behind the heart. This emphasizes how readily gastric dilatation causes mechanical displacement and embarrassment of the cardiac movements.

¹ Berliner klin. Wochenschrift, 1910, No. 9.

SKIAGRAPHY VERSUS AUSCULTATORY PERCUSSION. Hertz and A. C. Jordan¹ assert that "in the case of the normal non-distended stomach, the area of resonance, as marked out by auscultatory percussion with the patient lying on the couch, has no relation, except by chance, to the shape of the stomach as shown by a bismuth meal. The normal stomach usually takes the form of a rather narrow tubular organ, placed vertically on the left side of the abdomen, turning inward somewhat sharply at its lower end, at about the level of the umbilicus. The resonant area marked out by auscultatory percussion usually passes horizontally across the abdomen at a higher level. This area may be seen on the fluorescent screen as an area of increased trans-radiancy. It usually consists largely of transverse colon, although, in some cases, a portion of the cardiac end of the stomach is included in this clearer area. We have only to consider the ready way in which the various coils glide over one another, in accordance with the demands of the law of gravity, to realize that air-containing viscera must rise upward as far as they are free to do so. In this way, an air bubble of varying size is constituted, and, though usually of composite origin, it acts as a single resonance chamber."

"The following experiment, carried out by Dr. Jordan in conjunction with Dr. Hertz, is believed to form a most convincing proof of the inaccuracy of the older method of auscultatory percussion. Half a pint of bread and milk with two ounces of bismuth was eaten by the patient, who then lay down upon the *x*-ray couch. An expert in auscultatory percussion then marked out the stomach by this method on the patient's skin, keeping his eyes closed. A believer in auscultatory friction then did the same, and an almost identical outline was obtained. Finally, Dr. Hertz, with his eyes closed, marked out exactly the same area by auscultatory percussion. A metal wire was then fixed by strapping over the outline marked on the patient's skin, and a skiagram was at once taken by Dr. Jordan. The outline obtained by auscultatory percussion did not bear the slightest resemblance, in size, shape, or position, to the stomach shadow" (Fig. 19).

The area of "superficial gastric resonance" is of very small importance. When compared with the shadow seen with the *x*-rays, it occupies a relatively small area, which is generally confined to a portion of the upper half of the stomach.

In the case of the greatly dilated stomach, however, the condition of affairs is somewhat different. It is impossible to give a bismuth meal sufficiently large to fill the entire stomach, consequently the bismuth meal occupies only the most dependent parts of the stomach, whose real outlines cannot then always be marked out. A dilated stomach distended with gas forms a resonance chamber of its own, and its borders can be marked out readily, even by ordinary percussion,

¹ British Medical Journal, 1910, vol. ii, p. 232.

without fear of including the transverse colon's resonance with it, for in this case the colon is far less tensely filled, and emits a different note.

"When the patient is examined radioscopically in the vertical position, that portion of the air bubble which is due to air in the stomach rises to the top and is seen close under the diaphragm; while that portion which is due to gas in the transverse colon usually separates into two portions,¹ occupying respectively the splenic and hepatic flexures."

It would be interesting to know how much better this method is than the mapping out a stomach by auscultation while it is being inflated with a Davidson syringe attached to a stomach tube.

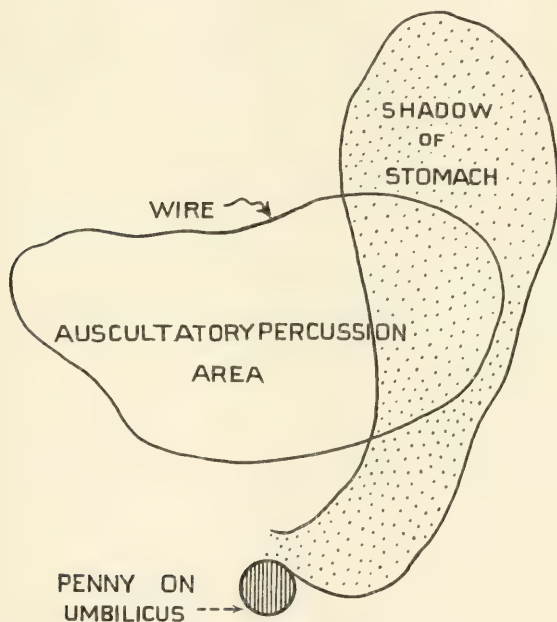


FIG. 19.—Skiagraphy *versus* auscultatory percussion. (Hertz and Jordan.)

Schurmayer² recently emphasized the value of "*Röntgenopalpation*" of the abdominal viscera. This is practically manipulation of organs under the guidance of the eye. Schurmayer considers the method especially valuable in establishing the diagnosis of *pathological fixation of organs*. He states, as an example, that the well-known sequelæ of cholecystitis—pericholecystitic adhesions—which may obstruct the pyloric end of the stomach or the hepatic flexure of the colon, causing their pathological fixation, can be felt and seen under the x-rays. He observed, moreover, that such adhesions may cause severe colics several

¹ Archives of the Röntgen Ray, September, 1910, No. 122, p. 162.

² Med. Klinik, 1910, No. 26, p. 1017.

hours after meals. As proved by Röntgen examination, the time when the colic occurred corresponded exactly with the time when the ascending colon and hepatic flexure were filled with masses of ingesta. Schurmayer is convinced, from what he has seen since the introduction of bismuth meals, that intestinal colic occurs more frequently than was generally supposed, and that it is very often confused with colic due to stones.

Abnormal situation of the viscera (enteroptosis) is usually accompanied by a lowering, and flattening of the dome of the diaphragm, and an increase in the normal costophrenic angle of 30 degrees to as much as 90 degrees.

The vast material at the Wiener Allgemeines Krankenhaus is well known. The Röntgen laboratory, of which Holzkecht is director, receives cases for diagnosis only after they have been subjected to a most thorough and painstaking clinical examination. Some of Holzkecht's recent work is referred to elsewhere in this article.

PYLORIC STENOSIS. In over 1000 x-ray examinations of the stomach, Haudek,¹ one of Holzkecht's assistants, concluded that (1) a stomach which within six hours has expelled a meal consisting of 40 grams of bismuth carbonate and 300 grams of milk and farina "pap" is free from suspicion of organic pyloric stenosis; (2) a remnant—no matter how slight—of such a meal found in the stomach twenty-four hours after ingestion is pathognomonic of pyloric stenosis. In the most extreme grades of stenosis, remnants have been seen ninety-six hours after eating.

Haudek's usual procedure is to examine cases Röntgenoscopically six hours after a test meal has been taken. He states that the diagnosis as to whether or not a patient has pyloric stenosis can then be made at a glance. If no stenosis is present, the stomach is empty and bismuth is in the colon; he then administers another bismuth test meal, and obtains a picture showing the relations of the stomach and colon, both filled with bismuth.

Haudek believes this method of diagnosing pyloric stenosis to be most accurate. He even states that he was able to make the diagnosis of pyloric stenosis in certain cases, subsequently proved correct at operation, which gave no clinical signs of this condition except by the x-ray examination.

The other x-ray criteria of pyloric stenosis—the dilatation and abnormalities of peristalsis—are considered by him to be absolutely unreliable as diagnostic aids.

The advantages claimed by Haudek for this procedure over the usual clinical method of test meal and subsequent removal by stomach tube are as follows:

¹ Wiener med. Woch., 1910, p. 2094.

1. There are no contraindications for this method.

2. It is technically simple. The recognition of a sickle-shaped bismuth remnant, as well as its amount, at the caudal end of the stomach is very easy, with a little practice.

3. Not only can pyloric stenosis be demonstrated, but its degree can also be determined.

It may be added that the eating of a bowl of "pap" is far pleasanter for the average patient than the passage of the stomach tube.

DIAGNOSIS OF HOURGLASS STOMACH. The importance of using the *x*-rays in establishing a diagnosis of hourglass stomach has been pointed out by both surgeons and radiographers. Recently, Bier¹ showed a series of plates demonstrating the great utility of this procedure. He considered actual observation, by means of the fluoroscopic screen, of even greater value than the taking of pictures, provided that the observer was sufficiently experienced to recognize the numerous sources of error which may occur. For details regarding the difficulties of this most interesting field, the reader is referred to the articles of Arthur Hertz² and H. E. Barclay.³

Jonas,⁴ in a review of cases of *spastic hourglass stomach* described in the literature, called attention to the fact that these were proved not only by Röntgen pictures, but also by actual observation of the spastic contractions at operation. Inconstancy of the phenomenon under the *x*-rays was characteristic of the condition. The spasm occurred both in the presence of gastric ulcer and in its absence. Further, Jonas claimed that it was possible to make a differential diagnosis between spastic and organic hourglass stomachs. He wrote that, in cases which were purely functional, upon administering 0.001 gram of atropine subcutaneously, the spasm disappeared upon the Röntgen screen. The spasms due to the presence of erosions did not vanish after giving the atropine. In such cases a milk diet was maintained for eight days, with the result that even in obstinate conditions the spasms disappeared.

Rieder, in his book (1910), dealing with the hourglass forms of the human stomach gives an excellent résumé of the knowledge we possess regarding this subject up to date.

According to Finckh,⁵ in his article on the *x*-ray diagnosis of surgical diseases of the stomach, the carcinomata, the presence of which cannot be demonstrated by palpation, give a far poorer outlook for the performance of a radical operation than those which are palpable and visible. Their relative percentages are 13 as opposed to 23.

¹ Centralblatt für Chirurgie, 1910, p. 958.

² Archives of the Röntgen Ray, September, 1910, p. 127.

³ Ibid., October, 1910, p. 117.

⁴ Wiener klin. Rundschau, 1909, Nos. 47 and 48.

⁵ Bruns' Beiträge z. klin. Chir., 1910, Band lxxviii, Heft 1.

Haudek¹ reports that he has been able in certain cases to demonstrate *pathological diverticula of the stomach* where a limited portion of bismuth lingered behind at a higher point in the stomach (the cardia or pars media), while the rest of the bismuth meal had passed beyond. It transpired that the formation of such a bismuth deposit occurred in those types of ulcer which, invading the neighboring tissues, led to the formation of an abnormal extraventricular cavity. Schwarz, in 1900, had designated these as chronic perforating, callous, gastric ulcers. Their cavities were mostly situated in the liver or pancreas, which had become adherent to the stomach. They occurred most frequently on the lesser curvature a short distance from the pylorus. Although 300 such cases are reported in the literature, the diagnosis of their situation has never been easy. From the experience gained in his 17 cases, Haudek has drawn the following conclusions:

1. When the stomach is filled with a bismuth meal, a diverticulum-like projection is seen on the lesser curvature in the region of the pars media.
2. After the bismuth has left the upper part of the stomach, a small quantity is seen to remain behind at this point, having the form of a half moon with its convexity downward.
3. Above this semilunar deposit is seen a bright area which represents an air-bubble.
4. Palpation does not displace this deposit.
5. Sometimes this deposit is not visible upon routine examination, but only when the patient's body is somewhat turned does it finally become apparent.
6. The quantity of the deposit can be augmented by laying the patient on the right side because of the ulcerative diverticulum being situated on the lesser curvature.

DUODENAL STENOSIS. Holz knecht,² in an article on duodenal stenosis, stated that in the course of several thousand *x-ray* examinations of the stomach made by him, it was also possible to recognize the normal Röntgen appearance of the healthy duodenum. Among this plentiful material, five cases were found which did not show the normal type of phenomena, and which, taken all in all, justified the diagnosis of duodenal stenosis. An abnormal widening, which permitted the collection of unduly large amounts of ingesta, involved a part or all of the duodenum. This was considered evidence of intestinal stasis.

Furthermore, certain rhythmic peristaltic movements of this dilated part were observed to take place within a few seconds' time, and were interpreted as muscular activity of the intestinal wall endeavoring to overcome the stricture situated at the caudal end of the dilated segment of intestine.

¹ Centralt. f. Chir., 1910, p. 1555.

² Deutsche Zeitsch. f. Chir., Band cv, p. 54.

In these cases, various parts of the duodenum were involved. This led Holzkecht to state that the exact localization of a duodenal stenosis is rather easy for a man experienced in this sort of work.

Although gastric dilatation often accompanies duodenal stenosis, Holzkecht believes that the rather finely drawn differentiation between pyloric and duodenal stenosis is justified, inasmuch as under certain circumstances the operation of choice might be duodenojejunostomy instead of gastro-enterostomy.

FUNCTION AFTER GASTRO-ENTEROSTOMY. Gastric function at shorter and longer intervals after gastro-enterostomy has been systematically studied by Ribas y Ribas and Prio.¹ Their work is mentioned here for the sake of completeness, and their results will be referred to under surgery of the stomach.

SMALL INTESTINES. Very little has appeared regarding the x-ray diagnosis of pathological conditions of the small intestines. Diverticula have been readily demonstrated.

APPENDIX. The exact position and location of the appendix by this means is possible in certain favorable cases. Aubourg² has recently shown this in plates taken eighteen hours after ingestion of the bismuth meal. This indicates a possibility, in certain cases of right iliac tumor, of establishing the anatomical relations of the appendix to the mass.

In an interesting communication upon his experiments in locating the appendix by means of the Röntgen ray, Liertz³ says that only since 1909 have x-ray pictures of the appendix been known. His technique consists in administering a tablespoonful of bismuth in milk four hours before making the first exposure. His investigations were carried out upon a number of convalescent patients, some of whom suffered from chronic constipation. In only about 50 per cent. of the cases was it possible to get positive results. In these, by means of a series of exposures, amounting in the aggregate to five minutes under the ray for each individual, Liertz was able to observe the filling of the appendix, followed by its gradual emptying.

One case, in which the diagnosis of neurasthenia was made, showed a constant shadow of the appendix in the pelvic position. The findings at subsequent laparotomy in another hospital showed a chronically inflamed appendix corresponding exactly in location to the bismuth shadow.

Moreover, in the cases giving positive findings, it was observed that bismuth remained in the lumen of the appendix after the cecum had become empty, and was gradually emptied from the appendix by its peristaltic movements. Naturally, the tip retained the bismuth longest and was last to be emptied. In some cases, certain spots along the appendix wall still showed traces of bismuth after the rest of the lumen

¹ Barcelona, May, 1910.

² Presse Méd., 1910, No. 43.

³ Deutsch. med. Woch., July 7, 1910, p. 1269.

had become empty, probably due to the presence of irregularities of the mucous membrane, which Liertz believed predisposed to the retention of intestinal contents as well as bismuth.

LARGE INTESTINE. Two methods exist for filling the large intestine with bismuth suspensions. One is by administering the usual bismuth meal and then waiting seven hours or more before beginning the *x*-ray examination; the other is to give a bismuth enema (bismuth carbonate, 80; bolus albus, 250; water, to make 1000 c.c., Groedel) and to proceed immediately with the Röntgen investigation. In a case of tight stenosis of the large intestine, both methods may be indicated.

In a review dealing with the progress of gastro-intestinal surgery, Moszkowicz¹ states that the *x*-rays have been of great use in determining the location of *neoplasms of the large intestine*. They were recognized by the fact that the bismuth meal was seen to remain at a certain point for two or three times twenty-four hours, and that, upon repeating the experiment, the same result could constantly be obtained.

The subject of a *mobile cecum* was discussed in last December's number of *PROGRESSIVE MEDICINE*, and in issues previous to that. Schwarz² suggests the following procedure for establishing the diagnosis of this condition by the aid of *x*-rays. The cecum and ascending colon become filled about seven hours after the taking of a bismuth meal. Orthodiagrams are then taken of the cecum with the patient upright, and also lying upon the left side. Normally, the cecum in the latter position does not sag more than 1 cm. toward the median line, although it may move several centimeters toward the head. On the other hand, a mobile cecum is found displaced several centimeters toward the median line.

The radiographic studies by Holzknecht, upon the *peristalsis of the colon* have been reported in *PROGRESSIVE MEDICINE* of December last, and therefore need no further mention here. In the same number the reader is referred to a discussion of several other important Röntgen studies dealing with abdominal viscera.

In summing up, it seems that the recently developed methods of *x*-ray work in experienced hands have made it possible:

1. To demonstrate accurately the site of stenosis of the alimentary tract.
2. To differentiate, in some cases, between functional and organic constrictions.
3. To observe the effect of certain drugs (cathartics, sedatives, etc.) upon peristalsis.
4. To determine the existence of visceroptoses, and the actual efficiency of the various mechanical measures (corsets, etc.) designed for their relief.

¹ Med. Klin., 1910, p. 1163.

² Wiener med. Wochenschrift, 1910, No. 23.

5. To prove the existence, location, and size of diverticula of the alimentary tract.

6. To demonstrate the diverse ramifications of complicated intestinal fistulæ.

7. To observe accurately how artificial anastomoses of the intestinal tract, such as gastro-enterostomy, etc., functionate.

Such conclusions can be drawn only by an observer experienced in this field, who has made judiciously repeated observations, and who is able to recognize and eliminate sources of error as they occur. Furthermore, authorities all insist that the *x*-ray is merely an aid to well-established clinical methods, and that unless combined with a carefully taken history and a proper physical examination, its value as an aid in abdominal conditions is *nil*.

A recent communication by Cole and Einhorn, regarding radiograms of the digestive tract in which *air* was used to *distend the viscera*, appeared in the *New York Medical Journal*, 1910, p. 705. Interesting as their findings are, these authors nevertheless say that this method cannot replace the bismuth method, but that it probably will be found useful in conjunction with the older method.

Foreign Bodies in the Human Alimentary Tract are dealt with in a recent contribution to *Deutsche Chirurgie* (Band xlv), a collection of monographs established by Billroth and Luecke. Wölfler and Lieblein, the authors of this monograph, have given to medical literature a standard work of reference on this subject. Until one has glanced through the table of contents, it is hard to believe in the existence of so much varied, unique, and essentially interesting material, dealing with foreign bodies found in the digestive tube.

Momburg's Aortic Tourniquet. Momburg's first communication on this subject appeared in the *Centralblatt für Chirurgie*, June 6, 1908, containing the report of two successful cases. Since that time this procedure has met with widespread acceptance in Europe. General surgeons, gynecologists, genito-urinary men, and general practitioners have all found it useful. Before dealing with its indications and contra-indications, let us first see what the procedure is.

The patient is placed in the Trendelenburg position. The end of a piece of soft rubber tubing, having the thickness of the index finger and the length of about four feet, is passed through under the back of the patient to be grasped by the hand of an assistant who stands at the opposite side of the operating table. The tube is then stretched to the utmost, and thus stretched, is passed by the surgeon midway between the border of the ribs and the iliac crests across the abdomen to the other hand of the assistant, whose duty it is to maintain tension. The free end of the tube is now led back under the patient by the surgeon and is again put on the stretch, the assistant, in the meanwhile, gradually releasing the bight of the stretched tubing, which now firmly

encircles the waist. While this is being done another assistant places a finger on the femoral artery to ascertain the moment of the cessation of the pulse. Observing the same steps, two, three, or more turns of tubing are exactly superimposed until the femoral pulse disappears. In slim individuals two turns will suffice; in fat or muscular ones, as many as six may be necessary. As soon as the femoral pulse is suppressed the ends of the tube are crossed and secured by forceps or ligature. After this is done, constrictors are applied to the thighs below Poupart's ligaments, and to the legs below the popliteal spaces. As soon as the operation is finished and all the vessels have been secured by ligatures, the rubber band encircling the waist is removed. Directly after this the other rubber ligatures embracing the thighs and legs are untied one by one. The object of this is the gradual extension of the scope of the circulation and the avoidance of a too sudden demand upon the efficiency of the heart muscle. By this switching on of one segment of the circulatory system after another, the readaptation of the heart to the changed conditions is gradually effected.

As to the applicability of the method, the following may be said: All surgery in and about the pelvis has been divested of its greatest danger—the uncontrollable loss of blood. It is of interest to note that this has been found of great value in postpartum hemorrhages, occurring in women of the poorer classes, delivered amid squalid, filthy surroundings, where there was much likelihood of infection through direct manual contact with the parturient canal in the course of packing, etc., by either midwife or physician. Inasmuch as this article does not deal with gynecological problems, it suffices to state that both abdominal and vaginal hysterectomies have been performed successfully with Momburg's tourniquet in place. Further, we encroach for a moment, and for the sake of completeness, upon genito-urinary territory, and mention that the technique of both suprapubic and perineal prostatectomies has been reported as much easier under the artificial anemic conditions created by the use of the abdominal tourniquet. In this connection it is noteworthy that several cases bled to death following major pelvic operations in which, because of the artificial anemia, the operator had not noticed his failure to tie important bloodvessels. Inasmuch as the hemorrhage began only after closure of the external wound and release of the constrictor, the true state of affairs was not recognized until too late. Mortality from such causes is not the fault of the method, but of the surgeon performing the operation. With the constrictor in place, the situation of the smaller and smallest vessels is indicated by the presence of drops of blood, each marking a cut orifice. The tourniquet should be cast loose at the completion of the essential part of the operation, so that any bleeding points which may have escaped notice can be properly secured before closure of the wound is begun. General

surgeons have successfully employed the tourniquet in extirpation of the rectum, interilio-abdominal amputation and exarticulation of the hip-joint.

The tourniquet has been safely applied for as long as two hours and twenty minutes. Probably this can be extended to three hours without serious damage, a circumstance of inestimable value in certain emergencies. In injuries with excessive hemorrhage caused by accidents in war, on railroads, in mines, or in factories, preliminary stasis can be readily secured by the simple means of elastic constriction. Thus time will be gained for the transportation of the patient to a hospital or other place where safe, expert, and definitive surgical relief may be had.

The immediate effect of the procedure is: (1) The circular approximation of the abdominal parietes to the third and fourth lumbar vertabræ; (2) the compression of the aorta against the spinal column, (3) the compression of the root of the superior mesenteric and perhaps spermatic arteries.

It was noticed that immediately upon application of the tourniquet, the blood pressure increased markedly. Rimann and Wolff¹ instituted animal experiments, as well as observations upon patients in Trendelenburg's clinic. These showed that occlusion of the aorta had little influence upon blood pressure. The moment, however, that the superior mesenteric artery was also blocked, a gradual rise in blood pressure followed within a few seconds. After the removal of the rubber tubing there was a very marked drop in pressure. The explanation of these facts seems to be that the sudden reduction of the area of circulation caused by compressive occlusion of the aorta and superior mesenteric arteries produced an increased resistance, which had to be overcome by an augmented effort of the heart. This effort again was the cause of a considerable amount of cardiac fatigue, which, upon removal of the constriction, manifested itself, even in healthy and young persons, by rapid sinking of the blood pressure. As we shall see shortly, in discussing contraindications, whenever a worn-out and damaged heart muscle is made to undergo this effort, it may become directly insufficient as soon as the greater strain is put upon it, that is, while the constricting tube is still *in situ*; or, having overcome this initial strain, it may fail when, upon removal of the rubber band, the excluded portions of the circulation are switched on—and this for the reason that the sudden extension of the circulation from the restricted to the normal area constitutes, in itself, an additional demand upon the energy of the heart, especially a heart previously enfeebled by disease, and by the unusual effort thrust upon it in carrying out this method. For this reason, Momburg strongly advocates

¹ Deutsche Zeit. für klin. Chir., 1908, Band xeviii, p. 558.

the use of subsidiary elastic ligatures applied to the extremities preceding suprapubic constriction. By successively untying these ligatures one after another, the area of circulation is gradually widened and the heart is gently led back to its normal functional output of energy. In the vast majority of cases it is reported that during and after application of the elastic band no cardiac irregularity occurred. According to Zur Verth,¹ the blood pressure rises on an average of 24 mm. of mercury upon application of the constrictor, irrespective of whether this be done with the patient in the horizontal or in Trendelenburg's position. The movable intestinal coils slide upward, but the root of the mesentery remains at its former position, so that at times the mesenteric vessels are compressed at two points instead of one. In children, and in adults with a weak cardiac condition, the blood pressure, which had fallen upon removal of the tourniquet, was observed to fall still farther when the ligatures around the legs were released. Too extreme a drop in blood pressure is, therefore, obviated by casting loose the ligatures in succession, with proper intervals of time between.

The procedure is contraindicated in persons having weak hearts with poor compensation. However, the presence of a cardiac lesion, if well compensated, is no objection to the use of Momburg's method. A number of cases are reported in which patients having mitral stenosis successfully withstood operations in which the method was employed. Conditions in which the circulation may be impaired—such as exophthalmic goitre, nephritis, and arteriosclerosis—furnish adequate reasons for not using the method. Further, it should not be employed in cases in which lung affections are present.

Gross and Binet² report the case of a young woman upon whom an exarticulation of the hip according to Faribault was performed under Momburg's artificial anemia. The legs were elevated for ten minutes before applying the tourniquet. It remained in position fifteen minutes. Upon gradual removal of the tourniquet—at the very moment when it became entirely loosened—the heart action stopped. Autopsy revealed a markedly dilated right heart, fatty degeneration of the cardiac muscle, and an old endocarditis affecting both mitral and aortic valves. Gross and Binet, therefore, believe that Momburg's method is contraindicated in valvular lesions even if fully compensated. This conclusion seems rather extreme in view of the fact that other authors report the successful use of the tourniquet upon individuals having marked, but well compensated, cardiac lesions. It is generally advised, therefore, that before beginning an operation a functional test should be made with the tourniquet in place, so that should any latent sign of cardiac weakness exist, it may become apparent.

¹ Münch. med. Woch., 1910, No. 4.

² Revue de Chir., xxx, Ann. No. 5.

Hoehne¹ ascertained that the ureters are actually occluded with the tourniquet in place. No damage to the kidneys, ureters, or bladder has been reported thus far.

Up to the publication of Burk,² no injury to the intestine from application of the tourniquet had been reported. In the case of a rather thin girl, a severe enteritis set in following operation, and a fatal peritonitis developed. At autopsy, a number of intestinal loops exhibited hemorrhagic constrictions. In short, gangrene of the intestinal wall, with subsequent peritonitis, was directly traceable to the employment of Momburg's tourniquet. Burk, therefore, added emaciation and the presence of intestinal affections to the list of conditions in which the employment of Momburg's method is contra-indicated.

Certain authors have reported their inability to obtain the desired hemostasis. Some attribute the failure to insufficient arterial compression, and others to a slipping of the aorta from the eminence of the spine.

The ligature should be applied just tightly enough to bring about cessation of the arterial pulse below. If this be the criterion of the degree of pressure to be used, it seems very unlikely that any injury to the intestine can occur. In short, Momburg's method is a distinctly valuable addition to the surgeon's resources. It deserves widespread recognition and adoption.

Grossich's Method of Disinfecting the Skin by means of tincture of iodine is being used in abdominal work, as well as elsewhere, by a fairly large number of American surgeons at the present time. It is important to remember that water should not be applied to the skin just previous to the application of the iodine, for, when this is done, the skin absorbs a certain amount of water. This prevents the penetration of iodine to a proper depth, and, therefore, does not allow the disinfection of the deeper layers of the skin, which is accomplished when the Grossich method is properly carried out.

Ossification in a Laparotomy Scar is reported by Lecene.³ A man, aged forty years, was operated upon for a gastric ulcer, and, on account of postoperative hernia, came again to laparotomy two years later. At this time, a bone, with typical Haversian canals, and containing marrow, was removed from the scar.

The Significance of Localized Tympany following Abdominal Trauma. Hassler⁴ reports the frequent occurrence of a zone of circumscribed tympany in the region of the injured spot following severe abdominal injury—whether from blunt trauma, or as a result of stab or gunshot

¹ Münch. med. Woch., 1910, No. 8.

² Beitr. z. klin. Chirurgie, 1910, Band lxxvii, Heft 2.

³ Bull. et Mém. de la Soc. Anatom. de Paris, 1909, No. 5.

⁴ Archiv. de Méd. et de Pharm., Milit., March, 1910.

wounds. He considers this to indicate the existence of an opening in the stomach or intestine. This symptom is due to a local collection of gas walled in by adherent omentum and intestines, and furnishes a positive indication for immediate laparotomy, even where other signs are lacking. The earlier its appearance, the greater its value. He reports two cases in which early recognition of traumatic intestinal perforations by this means made it possible to save the patient by operation.

The Resemblance of Certain Types of Addison's Disease to Acute Peritonitis has been recently brought to notice by Landow.¹ He observed a young man, aged nineteen years, sent to the hospital with a diagnosis of peritonitis. The onset was acute, marked by vomiting, severe abdominal pain, and rigidity. Nevertheless, it was decided to refrain from operation because, aside from a bad general condition, there was typical pigmentation of the skin and muscle spasm involving not only the abdominal wall, but also the lower extremities. The patient died shortly after. Autopsy showed nothing further than tuberculosis of the adrenal glands. Landow was able to collect five similar cases from the literature.

Magnesium Sulphate as a Purge after Laparotomy. Magnesium sulphate is one of the most commonly used cathartics for effecting the first postoperative movement after laparotomy. The fact that circumstances exist in which such a dose of "salts" may cause very marked toxic symptoms is not generally known. Therefore the cases of magnesium-sulphate poisoning which Boos² cites have much interest, and his conclusions should serve as a warning against indiscriminate use of this drug. He states:

"Magnesium sulphate in concentrated solution is absorbed, in part at least, from the gastro-intestinal tract into the blood.

"If a sufficient amount of the salt is absorbed at a given time, poisoning will result; of the 10 cases reported, 6 resulted fatally. The symptoms and autopsy findings in these cases agree very well with those observed in animals after the intravenous application of magnesium sulphate.

"On account of the slowness of its excretion from the system, magnesium sulphate, given repeatedly in concentrated solution, may produce poisoning by cumulation.

"In normal conditions of the bowel, magnesium sulphate, in proper dilution, is a valuable cathartic; Hunyadi water, for example, is practically a 3 per cent. solution of Epsom salt. It is not wise to give magnesium sulphate indiscriminately in cases of so-called acute intestinal obstruction, because when peristalsis is much diminished

¹ Deutsche Zeitsch. für Chirurgie, Band ci, p. 67.

² Journal of the American Medical Association, 1910, vol. Iv, p. 2037.

or absent, and in cases of mechanical obstruction of the bowel, even dilute solutions will be absorbed with consequent danger of poisoning.

"In cases of suspected magnesium poisoning, large quantities of normal salt solution should be given intravenously. Dilute solutions of lime salts given hypodermically may also be of benefit.

"The subcutaneous use of magnesium salts to produce catharsis, as proposed by Wade, is not only irrational, but also dangerous."

Peristaltic Hormones. Zuelzer¹ states that certain cells of the gastric mucosa form a chemical substance, or hormone, which reaches the intestinal cells through the blood stream and by its specific action upon them causes peristalsis. This substance is also produced by other viscera. Its formation by the spleen is especially plentiful. A commercial preparation of it has been made which is aseptic and contains no albumin. This is injected either intravenously or intramuscularly. A moderate fever of short duration frequently follows its administration. No ill effects on the heart's action have been observed. Its use is indicated in cases of chronic constipation, and in ileus following peritonitis. Its administration has been well borne by old people, as well as by those in greatly weakened conditions.

Henle² has administered this "peristaltic hormone" in a series of cases of intestinal paresis due to peritonitis. A careful study of his article does not convey a very convincing impression. In short, this is a new substance whose administration has caused no harm. It may do good; it deserves attention and impartial trial. However, the statements made in its favor are inconclusive. It is not easy to prove that a movement of the bowels taking place some eight or nine hours after its administration is due to the action of this substance alone.

Aspiration Apparatus. An extremely simple and convenient apparatus for aspiration used at the New York Hospital has been described by Kenyon and Pool.³ It has satisfactorily served its purpose for the last three or four years. Briefly described, it consists in the employment of suction, on the principle of the Sprengel pump. They use an ejector made by the Hayden and Derby Company, which can be operated at any pressure over twenty pounds, and may be connected with a water or steam pipe wherever convenient. In the operating room steam is used, whereas in the dispensary the ejectors are attached to the water pipes over the sink. For temporary use, at operations in private dwellings, an ejector or a filter pump may be attached to a water faucet. The filter pump is smaller and can be more easily attached to a faucet. It is obtainable from dealers in chemical apparatus. By means of this suction, a partial vacuum is created in a bottle, and from this bottle a comparatively short

¹ Med. Clinic, 1910, p. 422.

² Centralblatt für Chirurgie, 1910, No. 42, p. 1361.

³ Surgery, Gynecology, and Obstetrics, December, 1909.

tube leads to the region to be drained. The rubber tubing used must be stiff and non-collapsible (known to the trade as pressure hose). By means of the glass bottle it is possible to recognize the amount and character of the fluid aspirated, and to prevent contamination of the suction apparatus proper. The tube leading from the bottle to the field of operation is the only one contaminated, and can be readily cleansed by allowing it to suck up soap and water, and then removing it from the bottle and boiling it.

The authors of this article state that during operations it is desirable to immerse the nozzle of the tube in a dish of sterile solution from time to time, in order to wash out all material that might be dried by the air passing through the tube. Besides what has just been described,

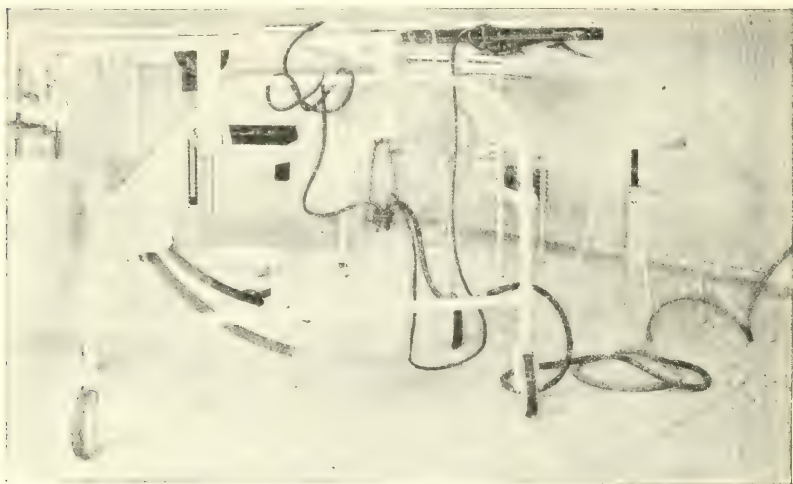


FIG. 20.—Operating table with large bottle suspended beneath. Stiff rubber tube connects bottle with pipe which is connected with an ejector in the engine room. Two other tubes lead from the bottle to the table top—one for the anesthetist, the other (sterilized) for the operator. (Kenyon and Pool.)

a smaller tube may lead from the bottle to the mouth of the patient, for the purpose of removing mucus or other material. Creevy, the anesthetist of the New York Hospital, devised a tip which prevents cupping action upon the mucous membrane, and at the same time insures uninterrupted suction (Fig. 20). A variety of appropriate metal tips may be used at the end of the tube, in the field of operation (Figs. 21 and 22). "Accumulations of fluid can be quickly and thoroughly removed in a cleanly manner, and collected in the bottle. If necessary, irrigation can go on at the same time without the usual sloppy result." At times, in the course of laparotomy, the end of the suction tube may become plugged with omentum or intestine, thus stopping its action. To obviate this, an outer tube was devised, perforated in numerous

places, and communicating freely with the atmospheric air at its outer end. This forms a well into which fluids gravitate, to be removed by the inner suction tube, which reaches nearly to the bottom. It is interesting to note the uses to which such an apparatus has been applied. Rapid evacuation of accumulations of pus, blood, etc., in the abdominal cavity, and simultaneous irrigation and evacuation of the peritoneal cavity, have been easily accomplished with it. Furthermore, "pieces of seamless tubing eight to ten inches long and one-sixteenth to one-



FIG. 21.—1, suction irrigator; 2, 3, 4, and 5, suction tips; 6, tip for pharynx (Creevy). (Kenyon and Pool.)

quarter inches in diameter, made of malleable copper (so that they can be easily bent to suit the conditions arising at operation), have been very successfully employed by Hartley as an adjunct to sponging, for obtaining a clear operative field in the removal of the Gasserian ganglion, and in brain, nose, throat, cleft palate, and bladder operations."

They conclude by stating that "appropriate tubular tips have been used very efficiently as retractors on tumors and tissues too friable to be held by a clamp, also to remove echinococcus cysts from the main

sac. In one case, a large inaccessible gallstone was removed from the common duct by means of a stiff rubber tip."

In an article on the Treatment of Ascites by Drainage into the Subcutaneous Tissues of the Abdomen, Paterson¹ describes a method which he has been using for draining the peritoneal cavity. He employs glass buttons of various sizes, depending upon the mechanical needs of the various cases. "The buttons consist of a perforated glass cylinder expanded into a flange at each end (Figs. 23 and 24). The largest size

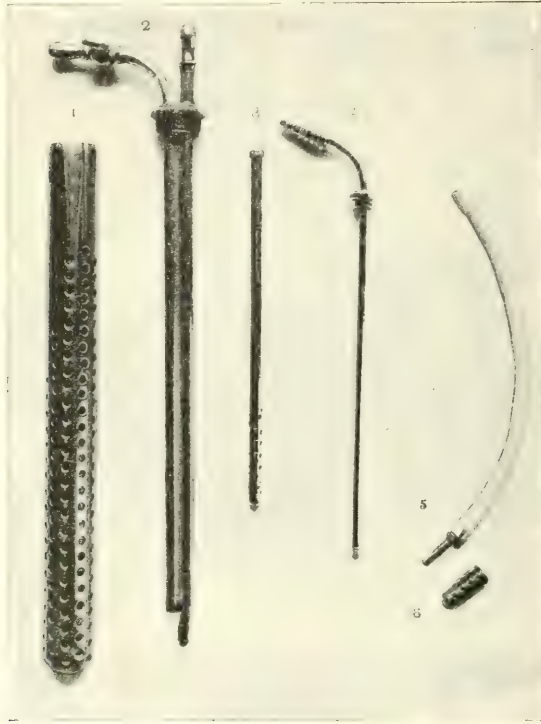


FIG. 22.—1 and 2, suction irrigator (disjointed); 3 and 4, suction tip (disjointed); 5 and 6, tip for pharynx (Creedy). (Kenyon and Pool.)

measures one inch across the flanges, three-quarters of an inch between the flanges, and has a canal one-twelfth of an inch wide. The diameter of the flanges and the width of the canal may be the same in the various sizes; but it is essential that the cylindrical part should vary in length, as this part has to pass through the thickness of the abdominal muscle; and as this thickness varies in different individuals, so also must the length of this part of the button vary. . . . Care must be taken to have all the edges and corners rounded, and every part perfectly smooth."

¹ *Lancet*, 1910, p. 1273.

The operation consists in "an incision about three inches long made in the middle line below the umbilicus, with the peritoneal cavity opened in the line of the incision. If the abdomen has not been previously tapped, the greater part of the ascitic fluid escapes at this stage. *The omentum is now drawn down and removed at a level well above the point where the drain is to be placed, because if left, it very soon passes into the opening in the drain and completely blocks it.*" In one case, failure was due to this step having been omitted. "The sub-

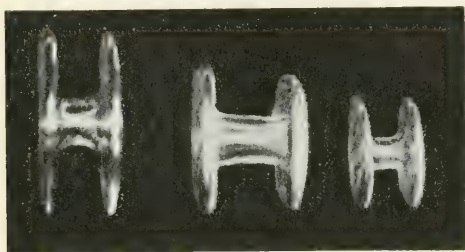


FIG. 23

cutaneous tissues are now dissected out on one side until the semilunar line is exposed, and through this an opening is made into the peritoneal cavity. This opening should be just large enough to permit of the button being placed in position. The drain may be passed either from the peritoneal or the subcutaneous side, but if from the latter, care must be taken to avoid stripping the peritoneum from the edge of the opening when inserting the tube, otherwise the flange may lie

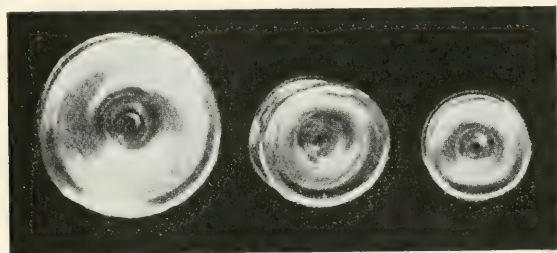


FIG. 24

between the peritoneum and the subperitoneal tissues. By slipping one flange edgewise through the opening, there is no difficulty in placing the button in position. When a suitable size has been chosen one flange should lie flat on the peritoneum and one on the abdominal aponeurosis, without any pressure being exercised on the intervening tissues. If too long, the apparatus would project into the peritoneal cavity, and the intestines might get nipped between the flange and the abdominal wall; while if too short, the button would tend to cut

its way through the thickness of the tissues in its grasp. If the opening for the drain has been made too large and the edges do not grip the button firmly, a purse-string suture should be placed close to the button on the aponeurotic side, so that when tightened the soft tissues are brought into close contact with the groove in the drain.

The subcutaneous tissues are next closely stitched by a continuous suture through the anterior layer of the sheath of the rectus. This suture is placed about one inch from the margin of the primary incision and parallel with it. By this means, the superficial end of the drain is shut off in a compartment of its own, and the fluid, as it escapes from the peritoneal cavity, is prevented from throwing too much strain on the suture closing the skin incision. The primary wound is sutured in the usual manner, the skin being closely stitched by a button-hole suture to prevent any leakage."

Postoperative course. "If the quantity of peritoneal exudate be considerable, a fluctuant swelling almost the size of the fist forms within twenty-four hours in the subcutaneous tissues around the drain; but as absorption becomes established in the superficial vessels, the swelling diminishes until only a slight edema remains to show that fluid is still escaping. When the exudate is small in quantity, the swelling does not pass beyond the stage of edema. It might be supposed that the intestines would adhere to the peritoneum around the edge of the button, and thus shut it off from the peritoneal cavity, but in two cases of patients who died several weeks after the operation, and where postmortem examinations were made, no adhesions were found, and the peritoneum was quite smooth up to the edge of the opening." Paterson has performed this operation with marked diminution of the abdominal distention, to the great relief of the patient, in a number of cases of ascites secondary to malignant disease, and also in cases of cirrhosis of the liver.

Early Rising after Operation. The advantages accruing to the patient by getting up as soon as possible after an operation are too well known to be detailed now. That such a procedure is not without its danger is also well known, but these dangers have, both here and abroad, not been sufficiently considered by overenthusiastic advocates of early postoperative rising. Following their lead, it seemed for a time as if the application of this principle might be overdone. Some cases have been reported where thrombi, which had already formed, became detached following the early getting up of the patient.¹ Büdinger,² in reporting experiences gained in the first surgical division of the Wiener Allgemeines Krankenhaus, states that while a marked improvement in general condition followed getting the patient out of bed early, nevertheless, almost the same degree of improvement could be obtained

¹ Björkenheim, cit. *Centralblatt für Chirurgie*, 1910, p. 87.

² Wiener klin. Woch., 1908, No. 49.

if one allowed the patients to move freely in bed. Naturally these observations do not obtain in cases of aged and decrepit individuals, or in other conditions in which indications have always been clear for getting the patient out of bed as soon as possible.

Surgery of Visceroptosis. Much has appeared in the literature of the past year concerning the surgery of visceroptoses. Undoubtedly there are many cases of marked neurasthenia due to these conditions which have been cured by surgical means. On the other hand, there is great danger that every neurasthenic with prolapsed organs will furnish a ready indication for unwarranted operation. The subject has received the widespread consideration which it deserves. Conservative and able surgeons, both here and abroad, have given it their careful attention. The subject is far from being cleared up. We hear a prompt report of the successes, but little is heard when the neurasthenic condition is not only unimproved but aggravated by surgical interference, and when the symptoms which furnished the indications before operation are perverse enough to continue. As has just been said, surgery has cured many cases. Here the operators maintain that the neurasthenia was secondary to the visceral displacement; but we observe that when the same operation has been performed for identical pathological situations, and cure has not followed, the statement is made that the patient was "a marked neurasthenic," implying thereby that the lack of resulting cure was not the surgeon's fault, but the patient's.

Anastomosis of Hollow Viscera by a Single Row Suture. Willard Bartlett¹ states that for suturing all hollow abdominal viscera, he has used a method consisting of a single row of continuous silk sutures, practically the same as the Connell continuous-mattress suture. The simplicity and time-saving qualities of this method are most commendable. Bartlett says: "In comparing continuous and interrupted sutures, all must admit that the continuous can be applied more quickly; . . . the experience of many operators has proved the single row suture anastomosis to be perfectly safe, *but not in careless or inexperienced hands.*" He uses a strand of silk about two feet long, armed at either end with a needle. The first knot is tied immediately after the needles have completed their first passage through the walls of the apposed viscera. His method of beginning end-to-end anastomosis is not new (Fig. 25), it having been first suggested by Murphy some time ago. In making a lateral anastomosis, the first suture is passed at the middle, leaving two needles ready for use (Fig. 26), the advantage of this being, that by beginning in the middle, both of the difficult corners can be turned with the wound wide open. This would not be the case if the operator were to begin at either end.

The illustrations show this method employed in effecting various

¹ Annals of Surgery, October, 1910, p. 520.

types of anastomoses; to anyone familiar with the Connell continuous mattress suture they need no explanation. Bartlett says: "After resection of the head of the ascending colon, there has been practically no difficulty in making end-to-end anastomosis between the ileum and colon of vastly different diameters." He has used this method for more than two years in every operation which he has been called upon to perform upon the hollow viscera of the abdomen. In no instance was there any leakage. He says: "It has been abundantly proved by Connell, as well as by others, that perforating stitches are harmful in theory only." This method is safe, because all the coats of the viscus are embraced, and consequently every stitch has a firm foundation. No form of suture operation could be done more quickly, because the least possible number of stitches and knots are employed. No permanent ill after-effects are to be anticipated, since a very scanty diaphragm is formed.

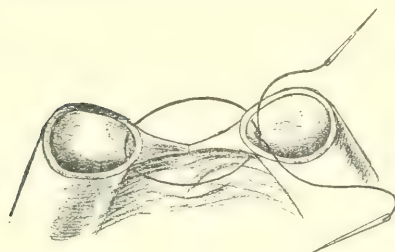


FIG. 25.—End-to-end anastomosis, first stage. (Bartlett.)

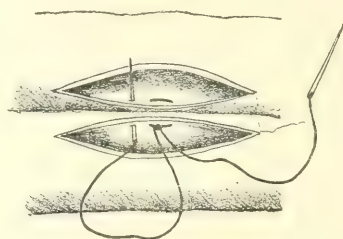


FIG. 26.—Lateral anastomosis, first stage. (Bartlett.)

The requirements of modern surgical technique are not satisfied by any method of anastomosing hollow viscera which does not guarantee safety, rapidity, and absence of bad after-effects.

In spite of these good results, the anastomoses made by two rows of sutures will probably remain in vogue with the majority of operators.

Implantation of Bile Duct or Ureters into Hollow Organs. R. C. Coffey,¹ Portland, Oregon, has suggested what, so far, seems to be the best method for implanting the severed common bile duct or ureter into the intestine. In his previous experimental work he noted that the bile duct always dilated after implantation into the intestine by the direct method. In one case the bile duct of a dog was "as large as a man's little finger and with walls almost as thick as those of an intestine." Coffey believed that the cause of this dilatation was the normal intra-intestinal pressure when brought to bear directly within the end of the implanted bile duct. To prevent this, he copied nature's implantation of the common bile duct into the duodenum and of the ureters into the bladder. He says: "It was readily seen that in these organs the intra-intestinal

¹ Journal of the American Medical Association, February 11, 1911.

and intravesicular pressure, instead of being brought to bear from within the duct, was brought to bear upon a much larger area on the side of the duct, thus making a perfect valve. The next question that arose was, Is it possible to duplicate this artificially? It was found impracticable to pass forceps between the layers of the intestine for the purpose of drawing the duct through. After thinking the problem over for some time, it was recalled that during the course of a gastro-enterostomy, when the serous and muscular coats are cut, and the submucous dissected, the mucous membrane pouts out between the cut edges of the wound, making it a hernia. The following method was, therefore, devised:



FIG. 27.—Preparing the duct for implantation into the intestine: *a*, splitting the duct to provide for drainage and tying the suture around half of the duct; *b*, tying suture around split duct; *c*, split duct ready for insertion. (Coffey.)

“(1) The duct is located and ligated with linen or silk. It is then cut in two above the ligature and the edges caught and held with mosquito forceps while one wall of the duct is split down with a pair of scissors, as shown in Fig. 27, *a*. A linen suture is now passed through the split end of the duct so as to include about one-half of it and tied (Fig. 27, *a*). The linen thread is then thrown around the other end and tied (Fig. 27, *b*). The loose ends are then threaded into two needles. By this method the full strength of the duct is maintained for traction, while the opening is maintained by the split (Fig. 27, *c*). The end of the duct is now wrapped with gauze while the intestine is prepared for its reception, which is done as follows:

“The part of the intestine desired is picked up and an incision made down through the peritoneal and muscular coats, including submucous

tissue, until the mucous membrane pouts out through the incision (Fig. 28). This incision should be about one inch long or more. (2) Five or six sutures are passed which pick up the peritoneal and muscular coats on each side of the incision. The suture at the upper end of the incision is tied as a control suture. The intermediate, intestinal sutures are lifted up on the flat handle of an instrument as they cross the incision. Now the intestine is brought close to the end of the split duct and the two needles carrying the threads (traction sutures) on the end of the duct are passed beneath the four or five intestinal sutures and through a stab wound in the mucous membrane into the intestinal lumen, and out through the intestinal wall three-quarters of an inch farther along the intestine, and one-eighth to one-quarter inch apart. By making tension on these threads, and at the same time



FIG. 28.—Incising peritoneal and muscular coats of intestine and feeling the mucous membrane from the muscular coat. (Coffey.)

pushing the intestine toward the duct, the duct is drawn beneath the intestinal sutures through the stab wound into the intestinal lumen, when the two ends of the threads on the duct are tied on the outside of the intestine at this point (Fig. 29). The intestinal sutures are then tied, producing the result shown in Fig. 30. After this operation, the duct lies just beneath the mucous membrane which has been loosened for approximately three-quarters of an inch of its course, so that it slides easily in its new channel. It is, therefore, necessary to tack the ureter to the peritoneum of the intestine near its point of entrance by two or three fine linen or silk sutures. Care should be used to take only the outer coat of the ureter in the bite of these sutures. Thus, practically all the steps of the operation are completed before the intestinal mucosa is penetrated, and no sutures penetrate the lumen of the ureter. The traction suture at the end of the ureter

within the intestine and the two or three anchor sutures fastening the duct to the intestinal peritoneum are the only means of retaining the duct in place. The same intra-intestinal force which later prevents regurgitation into the ureter now prevents the intestinal contents from leaking back by the loosely implanted ureter."

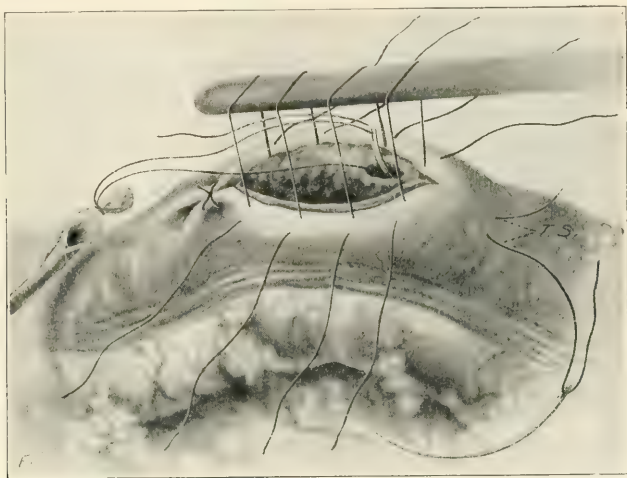


FIG. 29.—Sutures have been passed and duct is being drawn under the intestinal sutures through the stab wound in the mucous membrane. (Coffey.)

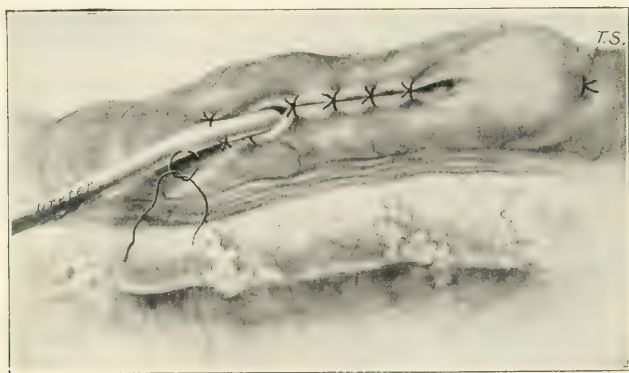


FIG. 30.—Duct has been implanted and anchored at its end inside intestine by tying traction suture *T. S.* Peritoneal sutures have been tied. Anchor sutures being placed to fasten duct to peritoneum. (Coffey.)

The mechanical correctness of this operation is shown by Figs. 31 and 32, with the explanations accompanying them.

In dogs killed on the sixtieth and sixty-first days after operation perfect results were found. There was no distention of the ducts above, and a ridge in the mucous membrane plainly marked the site of the reim-

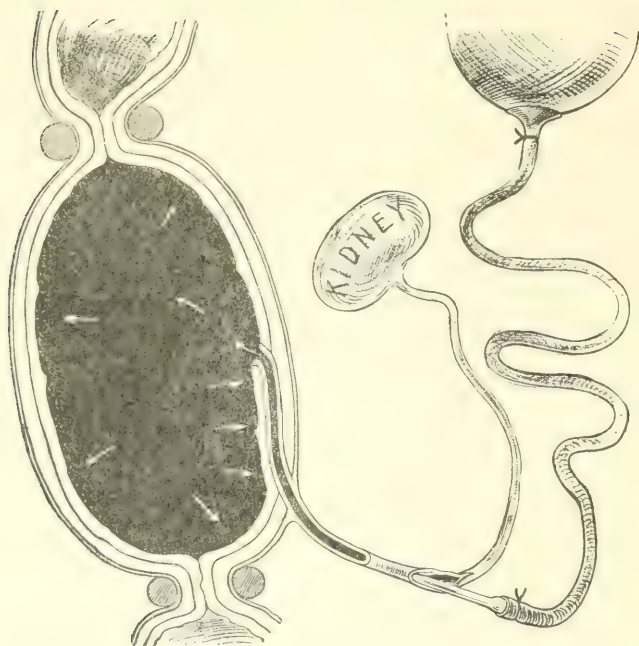


FIG. 31.—Filling with fluid a clamped section of intestine into which a ureter has been implanted by the physiological method. (Coffey.)

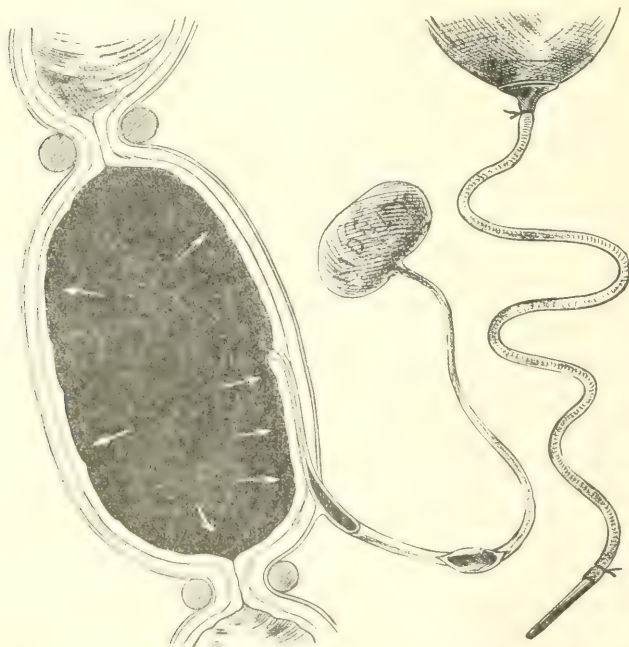


FIG. 32.—Physiological valve closed by the withdrawal of the nozzle, entirely preventing regurgitation of fluid into the ureter. (Coffey.)

planted duct—an almost exact imitation of the natural implantation of the common bile duct. Thus far, implantation of the ureters into the intestine by older methods has been very unsuccessful, both when performed experimentally upon animals and when practised, of necessity, upon human beings. On the other hand, Coffey's results have differed so much from customary previous experience, that it is worth while to quote his notes in part: "In a dog killed one hundred and sixty-nine days after operation, the kidney was normal—there was no dilatation of the ureter or pelvis, and the valve was perfect. The kidney was of the same size as the other, the ureter of which had not been implanted."

We have not space here to go into further details, but his experiments show that in not one of the nine cases in which the operation was performed did ascending infection take place. In six dogs in which the older form of direct implantation of the ureter was done, five died within a few days after operation, either from peritonitis or ascending infection. The surviving dog was fairly healthy after the lapse of sixty-one days, but it was found that the secreting portion of the kidney had been destroyed; in other words, the dog had survived the infection.

Coffey concludes by saying: "Our experiments in direct implantation are in exact accord with those others who have preceded us. The results of physiological implantation are much better. Ascending infection seems to be nearly eliminated as a danger, and if the physiological method should prove to be as much better than the direct method in patients as it has in dogs, it seems safe to assume that the mortality in the human being should be reduced to a point which would make the operation justifiable, and would thereby save the lives of many patients suffering from carcinomatous invasions of the bladder (or rectum) who now die for want of proper methods of dealing with the ureter."

THE OMENTUM

Omental Grafts a Preventive against Typhoid Perforation. Sante Solieri¹ states that laparotomy on typhoid patients, provided this is done before perforation, is relatively well borne. Since there is no great danger from operation at this time, and considering the enormous mortality of cases operated upon after perforation has taken place, he believes that laparotomy for prevention of imminent perforation is fully justified. Therefore, where ulcers are found which seem just about to perforate, this author recommends surrounding the affected intestinal loop with omentum, which is to be fixed in place by suture.

¹ Langenbeck's Archiv, Band xcii, Heft 3.

In a case in which he was able to follow out this technique upon a loop in the lower ileum, the patient recovered in spite of the complication of severe hemorrhages into the bowel; these had no connection with the operation.

Omentum as a Substitute for the Mesentery. Lanz reported a case in which, in the course of a gastric resection, part of the transverse colon also had to be resected, necessitating ligature of the colica media artery. He believed that gangrene of the gut was prevented by his reflecting the great omentum over the transverse colon, and implanting its free edge into the gap which had been made in the transverse mesocolon. This result stimulated von Haberer¹ to institute an extensive series of experiments with a view of determining to what extent the omentum could be made to serve as a substitute for the mesentery. In the course of his investigations, he ascertained that the marked divergence of conclusions reached by a number of different experimenters in this field probably depended upon insufficient consideration of the anatomical distribution of the mesenteric vessels, and upon the use of many diverse forms of technique, instituted with this inadequate knowledge as their basis.

According to von Haberer, the branchings and arrangement of the anastomotic vascular arches in the mesenteries of dogs and of man, are so different, that the results of technical procedures upon them cannot be considered analogous. On this account, therefore, operations which prove successful upon these animals cannot be repeated with safety on man. In any case, he is convinced that gangrene of the intestine following detachment of its mesentery and ligature of the vessels, cannot be prevented by subsequent suture of the omentum to the gut. Even should a collateral circulation develop by this route, its establishment would come long afterward, much too late to prevent the necrosis which promptly follows sudden cessation of mesenteric circulation.

Anatomical Variations of the Great Omentum. Rubin,² in an interesting study dealing with the functions of the great omentum, calls attention to certain anatomical variations of this structure. The length of the omentum varies from a few inches to what is a comparatively great length. The size it attains in fat individuals is well known, while in some cases of extreme emaciation it may be shrivelled to a mere shred, lying close to the lower margin of the transverse colon. Its attachments to the stomach vary. In certain instances its free edge hangs down from the pylorus, and in others it is attached to the duodenum—consequently the extent to which it embraces the hepatic flexure varies. At times when the right edge has extended well over the pylorus, it

¹ Langenbeck's Archiv, Band xcii, Heft 2.

² Surgery, Gynecology, and Obstetrics, February, 1911, p. 117.

may pass up to form a mesentery for the gall-bladder, which may extend from the cystic duct even to the anterior portion of the fundus. Rubin points out that such a normal structure may be mistaken at operation for an adhesion.

Regarding the behavior of the omentum in the presence of pathological conditions, he finds that in a certain number of cases it was entirely free, while its surface usually became adherent in umbilical hernia, laparotomy wounds, or in general peritonitis; in pelvic processes its edge played an essential role in walling off inflammatory processes. Unless neoplasms were the seat of inflammatory processes, the omentum was not found adherent to them. His conclusions are, that the omentum has no spontaneous motility, and that its displacements may be explained by the resulting balance of the following different factors: Intestinal peristalsis, intra-abdominal tension, the static condition of the various parts of the alimentary tube, and the anatomical relations of the omentum to the gall-bladder and spleen. The so-called chemotaxis is not demonstrable, for the voluntary and, as it were, intelligent locomotion of the omentum from the site of virulent infective processes can be explained by the influences upon it of varying amounts of peritoneal fluid and varying amounts of gas present in the large intestine. The apparently spontaneously protective role played by the omentum is simply due to its properties as peritoneum, and not to its part "as a superior organ with definite functions." "It cannot restore vitality to necrotic organs, nor vascular supply to those deprived of their circulation." An exception to this is a case of Richardson's,¹ in which a fibroid had, in the course of time, gradually lost its vascular supply from the uterus, and had acquired it from the vessels of the adherent omentum. "The end result of an adhesion between omentum and a foreign body is the destruction of the foreign body," or, at least, its isolation, while adhesions between omentum and other abdominal viscera result in the formation of scar tissue. Detached pieces of omentum rapidly become necrotic; only intact portions of it can produce serviceable adhesions. Its usefulness in inflammatory abdominal conditions depends upon the formation of adhesions, which cause more or less isolation of septic foci. Furthermore, this usefulness depends upon the power of its phagocytic elements to carry out their particular function in the process of inflammation.

While little if anything new appears in this study, its observations and conclusions are sensible and moderate, and it practically presents a synopsis of present knowledge regarding the pathological possibilities of the omentum.

¹ Surgery, Gynecology, and Obstetrics, September, 1910, p. 297.

THE STOMACH

Gastroscopy. Loening and Stieda¹ have recently shown a gastroscope with which, in favorable cases, excellent views of the stomach's interior have been obtained. The technical details of this apparatus are far too extensive to be mentioned here. Let it suffice to say that

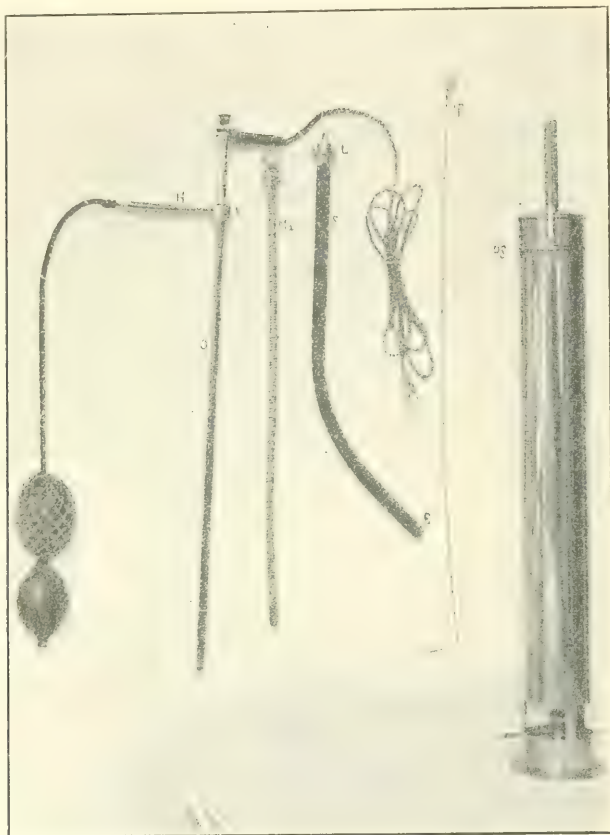


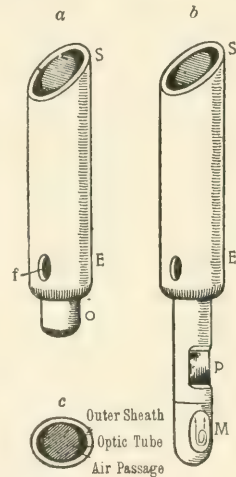
FIG. 33.—The oval tube (*S*) has a rigid upper half. Its lower flexible half has one central and two lateral openings (Fig. 34, *f*) at its tip (*E*). The flexible mandrin (*Md*) has a rubber tip. The optical part (*O*) is shown with rubber hand bulb and electric connecting cable. Swab carrier (*T*) and special sterilizer (*PS*) for entire instrument are also shown. (Loening and Stieda.)

an oval tube whose lower half is of flexible rubber, and whose upper half is made of metal and rigid, is introduced into the stomach of a conscious patient. Previous to introduction, a flexible mandrin is inserted into the tube. The patient lies upon the right side on a table.

¹ Mitteil. a. d. Grenzg., d. Med. u. Chir., Band xxi, p. 181.

The lower end of the flexible part has three holes—one central, and two lateral (Fig. 33). The object of these apertures will be explained shortly. After introduction of the tube, the mandrin is withdrawn and is replaced by the optical part of the instrument. This consists of a rigid, straight metal tube whose transverse section is circular, which, lying within the oval, outer tube, permits of an air space to either side. Its lowermost end carries a small electric light, just above which is a prism. This end projects into the stomach through the circular hole in the lower end of the outer tube. The lateral holes which are located at the lower ends of the two air spaces lying to either side of the inner tube, permit inflation of the stomach by means of a rubber hand-bulb, and afford accurate control of the degree of distention. (The diagrams show various parts of the gastroscope, including the mandrin, etc. (Fig. 33); also cross-section of the instrument,

FIG. 34.—The lower end of the optical part (*O*) projects through the central opening of the outer sheath's (*S*) lower tip (*E*); it carries an electric lamp (*M*) and a prism (*P*). Cross-section shows how the round optical part lying in the oval outer sheath has two semilunar air spaces to either side. By means of the rubber hand bulb (see Fig. 33) air is made to pass down these air passages, through the openings (*E*) at their lower ends out into the stomach. (Loening and Stieda.)



and details of the lower end just described (Fig. 34). Through turning the optic, it is possible to obtain a clear view of the stomach wall within a range of from 1 to 15 cm. The authors prefer to use air rather than water in dilating the stomach. They state that if water is used, the normal mucus soon becomes detached from the walls, and floats free, greatly hindering a proper view. With air dilatation this does not happen. With their instrument they have been able to view the interiors of stomachs as far as the antrum (Fig. 35). Only in very favorable cases was it possible to view, at the bottom of this funnel, the actual sphincter of the pylorus (Fig. 36). It is well known that gastric disease, whether inflammatory or malignant, comes to the surgeon sooner, and is diagnosticated at a far earlier stage when situated at a narrow part of the stomach than when located in its broader portions. In just these latter cases, in which ulcer or

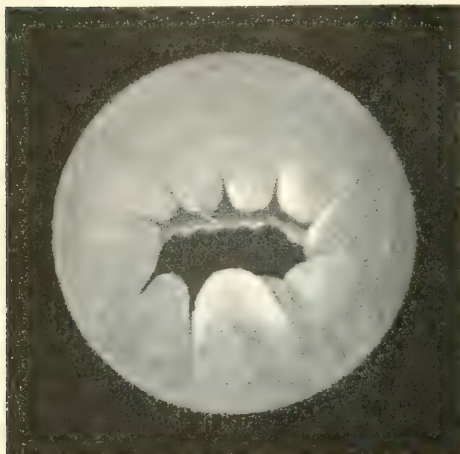


FIG. 35.—Antrum. (Loening and Stieda.)

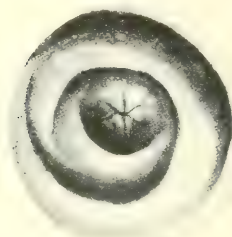


FIG. 36.—Pylorus. (Loening and Stieda.)

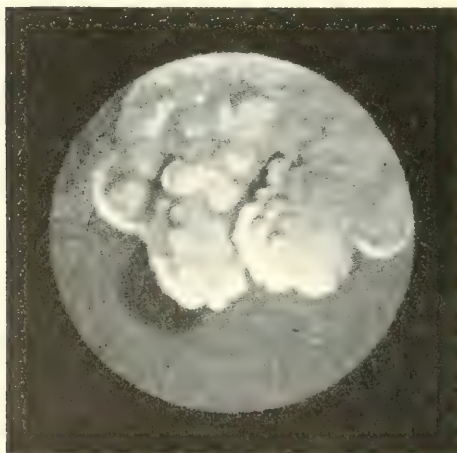


FIG. 37.—Carcinoma of stomach. (Loening and Stieda.)

cancer (Fig. 37) involves the broad body of the stomach away from its narrow orifices, and in which consequently few, if any, definite symptoms are present, and in which the *x*-rays help little if at all, gastroscopy can be an invaluable aid in diagnosis.

The gastroscope of Souttar is a huge, rigid affair with two distinct bends. It is apparently more difficult to introduce than the Loening-Stieda instrument, consequently the danger of inadvertently perforating the stomach wall with it is greater.

Chevalier Jackson is our American authority on gastroscopy. In his book he shows pictures of the stomach's interior similar to those of Loening and Stieda. In spite of recent advances, gastroscopy is still in a comparatively primitive state. Its performance requires a thorough, previous training plus much personal skill and patience.

The Surgery of Gastropptosis. Recent *x*-ray investigations of gastropptosis, or pyloroptosis, as it has been more recently named, have shown that the fundus of the stomach takes no part in the so-called displacements of that organ. The structures in the free edge of the lesser omentum hold the duodenum in place where they join it (at the junction of its first and second parts). Consequently, at times a kink occurs at this point. The stomach sags downward between the two fixed points of cardia and pylorus, stretching the lesser omentum to a paper-like thinness. The central portion of the transverse colon is also displaced downward, thereby increasing the angulation of the hepatic and splenic flexures.

Gastropptosis is usually part of a general splanchnoptosis, of which condition it, in some instances, happens to be the most marked feature. Mention of co-existing nephroptosis and hepatoptosis frequently occurs in the histories of these stomach cases; when indicated, these conditions were accorded the proper surgical treatment.

Rovsing¹ separated his patients with gastropptosis into two distinct classes: One, the so-called virginal type, occurs in scrawny, thin women who have borne no children, and whose abdominal walls are muscular and flat. The second type occurs in multiparæ with pendulous, flabby bellies. The indications for treatment vary according to which of these two types the patient belongs.

"The symptoms of gastropptosis are those common to several other affections of the stomach. Hence the diagnosis rests upon physical examination and on a process of exclusion, the culminating point of which is, in some cases, an exploratory laparotomy."² This assertion of Eve's is borne out by the statement of Rovsing, who reports that in only 18 out of his 75 cases was the diagnosis made before operation.

With gastropptosis of medium severity, the patients complain of pain and a sense of heaviness in the entire abdomen, especially to the

¹ Sammlung klin. Vorträge, August, 1906, No. 120, p. 522.

² Eve, British Medical Journal, May 7, 1910, p. 1098.

left of the umbilicus. The pains cease immediately upon the patient's lying down, quickly to recur upon resumption of the upright posture, and to become much worse if any active, bodily exertion be indulged in. These people tire easily, and maintain themselves in the upright posture with effort. They appear irritable, nervous, and worried; in short, they are neurasthenic. Loss of appetite and aversion to food result in gradual emaciation and loss of strength. Such cases are often considered to be suffering from simple colitis or chronic appendicitis.



FIG. 38.—Gastropotosis cachexia. (Rovsing.)

In types showing greater severity, usually in those having "virginal" abdominal walls, unmistakable gastric symptoms occur. Both cardialgia and pain in the lower abdomen are felt at meals or immediately afterward. Vomiting may occur at intervals, or may be so constant that everything swallowed is immediately rejected. These patients do not dare to eat properly for fear of pain and gradually limit their nourishment to a wholly inadequate quantity. The consequent emaciation and loss of strength in extreme instances may lead to as severe a cachexia as any due to cancer (Fig. 38). Rovsing states most emphatically that the cardialgia in these severer types of gastropotosis is due to the *quantity*, not the quality of the ingesta. That is, he finds that, unlike the pain of ulcer or gallstones, when individual experience

teaches the patient that some articles of diet are more certain to cause pain than others, in gastropptosis the pain comes after a certain definite, small amount of food has been swallowed, irrespective of its digestibility. In a number of Rovsing's patients, obstinate constipation was a prominent feature, while in an extremely cachectic case of Beyea's there was a marked auto-intoxication due to intestinal fermentation.

Beyea reports as follows: In 25 of his 26 cases there was marked emaciation, the various weights ranging from 77 to 120 pounds. All of his personal cases, 26 in number, had the "virginal" type of abdominal wall.

Formerly, physical examinations by inflation, auscultatory percussion, etc., were employed to reveal the degree of downward displacement present, while now, in *x*-ray examinations of stomachs filled with the Rieder bismuth subcarbonate meals, we have a most accurate method of determining the location, size, and functional ability of the stomach. Diagnosis by means of the *x*-rays is fully discussed elsewhere in this paper. Authors are practically agreed that dilatation is not the usual condition in gastropptosis; on the contrary, although it does occur, it is the exception rather than the rule.

Rest in bed and diet often benefit many cases; they gain weight and feel much better; some are cured. These represent the less severe types of the affection. Others, as long as they are in bed or leading a quiet convalescent's existence, feel well, but as soon as they resume an active mode of life promptly suffer a return of their former symptoms.

Mechanical support is indicated only in patients, usually multiparæ, having lax abdominal walls. Rovsing does not consider that corsets or similar appliances can do the least good in "virginal" splanchnoptoses.

Most cases of severe gastropptosis come to the surgeon as a last resort, having previously been through the entire gamut of medical and mechanical treatment. These people are emaciated, sick and tired of their ailment, and very neurotic. Eve, Rovsing, and Beyea all regard this neurotic condition as a consequence of the gastropptosis, which promptly disappears with its cure. Naturally, when an essential neurotic condition is coupled with gastropptosis, cure of the organic displacement will not change matters much. Beyea, in his series of 26 cases, had but 2 with an essential neurasthenic condition.

The surgical treatment of gastropptosis consists in either (1) replacing the stomach in its normal site by (*a*) Rovsing's modification of Duret's method, or (*b*) Beyea's method, Eve's procedure being merely a modification of the same principle, or (2) by gastro-enterostomy.

For the historical interest attached to it, the procedure of Duret is shown in Fig. 39. The illustration speaks for itself. This was the first known attempt at gastropexy. As later results showed, it caused a weak adhesion to form, which soon gave way, allowing the stomach to sag again and, in addition, causing much pain to the patient.

Rovsing's technique (Fig. 40) provides for a broad adhesion between

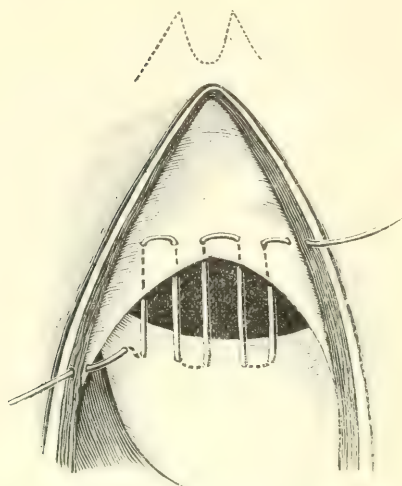


FIG. 39.—Duret's method of gastropexy.

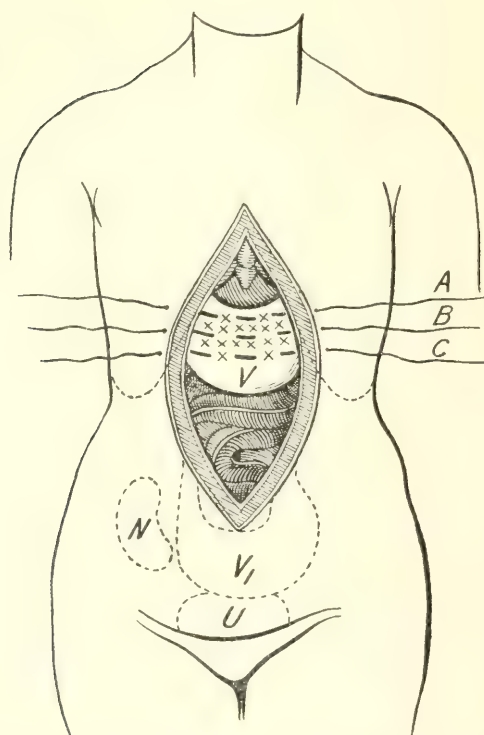


FIG. 40.—Rovsing's gastropexy. V, stomach; V₁, position of the stomach before operation; U, urinary bladder; N, right kidney; A, B, C, silk sutures; x, x, scarifications.

the upper part of the anterior surface of the stomach and the anterior abdominal parietes. Three parallel silk sutures are passed horizontally in and out of the stomach serosa. The uppermost suture is 1 cm. below the lesser curvature, the next two with 2 cm. space between. This leaves the greater curvature and lower third of the anterior surface of the stomach free. At either end these sutures are carried through the entire thickness of the abdominal wall. They are not tied until the abdominal wound is closed and dressed. Then a square glass plate wrapped in gauze is laid between the two rows of emerging gastric tension sutures and they are then tied over it. This serves to prevent puckering and to hold the stomach and the abdominal parietes flat against each other. That portion of the stomach which is to become adherent is superficially scarified before closing the abdomen. The silk sutures are withdrawn in three to four weeks. The advantage claimed for this being that no sutures are left behind in the abdomen.

Rovsing reports that at times certain difficulties were encountered in performing this operation. The prolapsed liver had to be gotten out of the way. This was accomplished by suture of its free edge to the abdominal wall close to the costal margin. If the edge was thin, it was resected. Thus, in either way, sufficient width was obtained for an adequately broad gastric fixation at the proper height.

The greatest difficulty, however, was not encountered in displacement of the liver, but was caused by a long, narrow thorax whose slightly separated costal margins met above at a very acute angle. Here the necessary width for properly anchoring the stomach in its normal position was lacking. In such cases, Rovsing suggested fixation lower down or gastro-enterostomy.

Beyea,¹ in April, 1898, performed the first *reefing of the lesser omentum for gastropptosis*. Since then he has simplified his original technique, and in his last 18 cases has "introduced but a single row of sutures from above downward across the gastrohepatic omentum (Fig. 41). The strength of the suture support and attachment above has been increased by introducing each suture through the distinctly thicker and stronger one-fourth of tissue forming the attachment of the ligament to the liver. The gastrohepatic ligament at the attachment to the liver for a distance of one-fourth to one-half inch is found formed into a strong, white, connective-tissue band, a structure holding the suture without danger of cutting out and forming a fixed point above against which to draw the lesser curvature of the stomach. The first suture is introduced, beginning above, in the strong tissue of the attachment of the ligament to the liver, described above; the needle, including considerable tissue, then grasps the more delicate tissue at short intervals from above downward, until a position just above the gastric vessels at

¹ Journal of the American Medical Association, 1910, vol. liv, p. 766.

the lesser curvature is reached." Four to six such sutures are passed about one inch apart (Fig. 41).

By this means the stomach is elevated to the normal position without disturbing its physiological mobility.

Eve, of London, does practically the same operation, except that he takes a slight amount of liver tissue and a little of the wall of the lesser curvature into his suture.

The results and criticisms of these two methods are as follows: Rovsing, in 1906, stated that he had performed 75 operations fixing the stomach to the anterior parietes.¹ He had been able to follow 50 of these cases up to a period of eight years; of these 50, all were well.

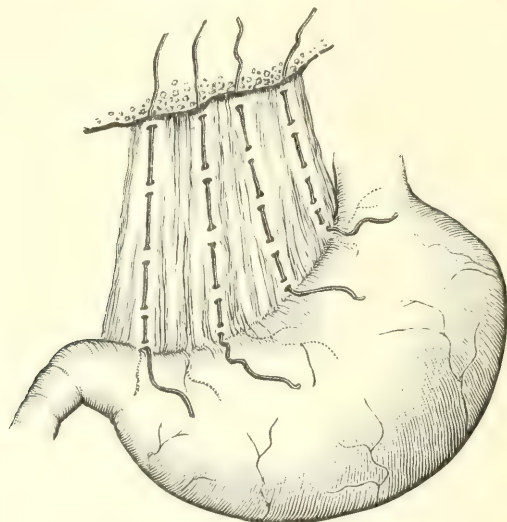


FIG. 41.—Beyea's method of gastropexy.

Since then, however, he has not published any further communications on the subject. The objections made about this method were that it led to hindrance of physiological mobility and painful adhesions. Rovsing, in writing about this, said that he has not seen any such ill effects from his operation. Nyrop,² of Copenhagen, attempted to controvert this statement, but the cases he cites do not furnish very convincing proof against the fixation method as a cure for pyloroptosis. Beyea received a verbal report of one case in which the patient became a hopeless invalid because of a fixation operation.

Regarding gastropexy as practised by Beyea and Eve, the opponents of their technique have maintained that the lesser omentum was too

¹ According to available literature up to date (February 1, 1911), the fixation operation has been performed eighty-two times.

² *Annales Internat. de Chir. Gastro-intest.*, 1906-07, vol. ix, p. 188.

frail to permit of suture, as, indeed it is, except at its margins. These authors, however, seem to have proved that the lesser omentum is sufficiently strong at its gastric and hepatic attachments to hold sutures passed there. Their results are as follows: Beyea reports 26 cases, with but 2 relapses, and these in markedly neurasthenic patients. Eve cites 11 cases, but they, on account of varied individual qualifications, are not of much statistical value, 4 being very recent, 3 marked neurasthenics, leaving only 4 of sufficient duration to pronounce them permanently cured.

All three authors (Beyea, Rovsing, and Eve) emphatically state that they operate only when a long and thorough course of medical and mechanical treatment has failed to afford relief. Further, all state that, in their successful cases, the vomiting and pain vanished, and the patients ate readily and with good appetite. They gained weight rapidly—in some instances taking on as much as thirty pounds. The neurasthenic symptoms likewise disappeared. This led to the belief that, in a majority of cases, the neurasthenia developed secondarily to the gastropotosis. In unsuccessful cases, neurasthenia persisted even though symptoms were relieved.

Constipation due to ptosis of the transverse colon, a marked feature before operation in many of Rovsing's patients, was cured by the raising and fixation of the stomach, which also helped to raise the colon. In his optimistic report it is stated that in women who had suffered from obstinate constipation for from twenty to thirty years in spite of the best medical treatment, normal defecation was reestablished after operation.

These glowing accounts, made by Rovsing in 1906, were not followed by any further communications on the subject. Beyea and Eve, in 1910, published 26 and 11 cases respectively, 35 in all, with 5 negative results.

In summing up, we have a total of gastric fixations in the literature of 82 cases (75 of these Rovsing's), and of gastropexies (reefing the lesser omentum), 40 cases in Beyea's collection, and 11 reported by Eve, 51 in all. Weiss recently published¹ a single case, in which Rovsing's technique was employed with success. He adds nothing new to our present knowledge. On this side of the Atlantic we fail to note very general adoption of gastropexy for gastropotosis. It seems as if the majority of operators were satisfied to perform gastro-enterostomy for this condition. However, the choice of procedure will always depend upon the anatomical conditions as they present themselves at operation.

ROUX GASTRO-ENTEROSTOMY FOR GASTROPTOSIS. R. E. Balch² states that, according to the x-ray observations of Crane, "the most common form of dilatation of the stomach is really an elongation with

¹ Deutsch. Zeitschr. f. Chir., 1909, Band cii, p. 557.

² Surgery, Gynecology, and Obstetrics, January, 1911, p. 74.

prolapse of both greater and lesser curvatures, with the pylorus and esophagus as fixed points." This represents what he calls a drain-trap stomach (Fig. 42). Balch believes that this type demands drainage at the most dependent portion, which is frequently found resting in the true pelvis. He says: "If we make an anastomosis between this lower part of the stomach and the jejunum as it emerges from the mesocolon, it means that the greater curvature must be raised in the abdomen to the ligament of Treitz, which, being a relatively fixed point, suspends the dilated stomach at the point of anastomosis. . . . This will cause a closure of the opening by kinking of the jejunum or, by a partial anterior revolution of the stomach, will bring the anastomosis on the upper wall too high up for good drainage."¹ Lack of satisfactory results following gastro-enterostomy upon cases of severe

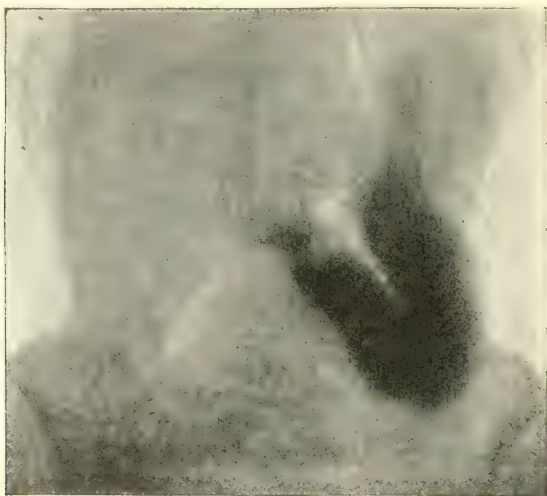


FIG. 42.—Skiagraph of "drain-trap" stomach. (Crane.)

dilatation with prolapse were considered by Balch to be due to the mechanism just described. He, therefore, chose the Roux gastro-enterostomy *en Y*, the advantages of this being that it anastomoses the most dependent portion of the prolapsed stomach with the jejunum, with no traction upon the point of anastomosis; and that when the stomach contracts in case of proper drainage, the point of anastomosis may rise in the abdomen with it. Balch states, in conclusion, that

¹ That this question is viewed differently by others is shown in Dr. Foote's article in *PROGRESSIVE MEDICINE*, June, 1910, pp. 93, 94, in which he states that Cannon and Leggett's results show "that the position of the stoma appears to have no demonstrable effect upon the course of food after these operations (gastro-enterostomy). . . . Cannon's studies have shown that, except in paralyzed organs, there probably is no such thing as drainage."

"the results following this operation in cases of severe dilatation or prolapse have been far more satisfactory than after the posterior no-loop operation."

Acute Dilatation of the Stomach has been frequently discussed in previous issues of *PROGRESSIVE MEDICINE*. Smith,¹ in a recent study, practically gives the general opinion as held at present here. He says: "Acute dilatation of the stomach is not rare. It is of comparatively frequent occurrence after surgical operations done under general anesthesia. The cases vary greatly in severity. It is presumable that many mild cases, which are unrecognized, but which occur in patients having a 'stormy convalescence,' get well without treatment. It is also presumable that some deaths following operations, in which the cause of death is not understood, are the result of this condition. Its occurrence cannot be forecast.

"The evidence is against a mechanical process as the primary causative factor. The weight of evidence favors a primary gastro-intestinal paralysis, manifesting itself most severely in the stomach on account of the anatomical relations of that organ. The paralysis may be central in origin, or peripheral, or both. Its exact source is at present undetermined. The paralysis, of whatever source, is transitory, and exists largely as fatigue. Prolonged operative procedures, trauma, and anesthesia are the most probable causes of this paralysis, narcosis being, I believe, the chief factor. Mesenteric compression, if present, is secondary.

"The most constant and characteristic symptom is the welling up of small amounts of bile-stained fluid at a time when postanesthetic vomiting should have ceased.

"The most reliable diagnostic measure is the passage of the stomach tube.

"The prognosis is good if the condition is recognized early and treated at once; otherwise, it is bad.

"Active treatment is directed to the relief of paralysis and the promotion of peristalsis by evacuation of the stomach contents and the evacuation of the bowel contents. Operative procedures are not indicated. Prophylactic treatment is directed to the minimization of operative trauma and anesthesia.

"Finally, rational preventive treatment for acute dilatation of the stomach will not be possible until the problem of its etiology is definitely solved. Laboratory experimentation will accomplish much toward this end, but the greatest factor toward the solution of the problem will be clinical observation and study of cases. To this end all cases should be reported in detail."

Paralyses of the Stomach following Anesthesia. In a most comprehensive article dealing with paralyses of the stomach following anes-

¹ Department of Surgery, Harvard Medical School, Bulletin No. 6, p. 17.

thetia, Payer¹ comes to some very interesting conclusions, which are substantially as follows:

1. In almost all cases, atony of the stomach could be proved to occur immediately after anesthesia ended, the lower border of the stomach often reached to the umbilicus, or even to one or two fingers' breadth below. The degree of gastric paresis varied, and bore no relation to the age of the patient. It had no connection with the presence or absence of enteroptosis. Only in very exceptional instances was it not possible to observe its occurrence after anesthesia.

2. These pareses of the stomach, in the great majority of instances, showed a benign character, subsiding in from twelve to twenty-four hours.

3. Postanesthetic vomiting stood in direct relationship with paresis of the stomach, for in all cases in which vomiting continued for a longer time, the existence of an enlarged stomach at this period could be demonstrated.

4. Excessive secretion of gastric juice is an accompanying symptom of the paresis.

5. The critical period for gastric paresis occurs from the third to the fifth day—namely, at the time when the administration of solid food is being commenced.

One can notice that following the ingestion of food, the borders of the stomach are displaced downward to a marked degree, even if this does not lead to a renewal of symptoms. These variations in size are easier to recognize in children.

6. Errors in diet affect these stomach pareses most unfavorably. Here, again, children show the greatest susceptibility, for in them marked dilatation of the stomach has been observed as late as the eighth day after operation.

Payer calls particular attention to the following observations. A fairly large number of patients complain of marked abdominal pain the first day after operation. They refer these disagreeable sensations to the upper abdomen and to the small of the back. Examination of such a complaining patient often reveals meteorism. Resistance in the epigastrium and a distinctly enlarged stomach have been repeatedly demonstrated in these cases.

Payer believes that these symptoms are largely due to a persistence or an augmentation of the paresis, inasmuch as they can be made to disappear within one or two hours by causing the patient to lie upon the right side.

Considered in brief, it may be said that anesthesia induces a greater or less degree of gastric paralysis.

Gastric paralysis and excessive secretion go hand in hand, and it

¹ Mitt. a. d. Grenzgeb. d. Med. u. Chirurg., Band xxii, Heft 3, p. 411.

depends upon the combined degree of both whether or not dorsal decubitus will lead to acute dilatation.

In this condition the stomach paresis and excessive secretion form the two factors which mutually aggravate or increase one another, and so lead to the production of a vicious circle.

TREATMENT. Payer believes that periodical emptyings, by means of the stomach tube, lead to a merely transient improvement. He has great faith in maintenance of the patient on the right side. This was first suggested by Malbranc (a pupil of Kussmaul), in 1880, as a means of relieving chronic dilatation of the stomach which had resulted from compression of the transverse duodenum by the root of the mesentery. As previously stated, the changes in the size of the stomach were particularly easy to verify in children. Here marked gastric dilatation, within even an hour after assumption of the right-sided position, could no longer be demonstrated.

Considering the immediate relief afforded by prompt passage of the stomach tube, and considering the brilliant results reported by Westermann and by Kappis regarding the benefits obtained by use of a permanent stomach tube, it seems as if there were an indication for the use of both of these appliances, as well as for the postural treatment in acute gastric pareses.

The majority of articles dealing with this condition tells of acute postoperative dilatation of the stomach as coming on after abdominal section of some sort. Thus its occurrence has been frequently noted after operations in the hypogastric as well as the epigastric regions; also after nephrectomies. But it is important to point out the fact that gastric dilatation has followed operations upon the extremities, the instalment of permanent catheters, and even bare administration of an anesthetic. Excepting a few recent communications, Payer's article contains practically all that has so far been published on the subject.

A Permanent Gastric Siphon in Acute Dilatation. According to Westermann,¹ "Many patients have so great an aversion to the passage of the stomach tube, that only in the greatest extremity is one willing to repeat its use. Further, at times this procedure is accompanied by such cyanosis and prostration that one forsakes this method, and some even prefer enterostomy."

To avoid frequently repeated introduction of the stomach tube for acute dilatation of the stomach, Westermann tried the following scheme:

In a case of severe peritonitis in a female patient, a tube was passed through the nose into the pharynx and so on into the stomach, where it was left *in situ* for a number of days. The result was very encouraging. During the first twelve hours, four liters of gastric contents were siphoned off, not to speak of large quantities of intestinal gases. Two

¹ *Centralb. für Chir.*, 1910, p. 356.

days later the tube was removed. At that time the drainage had afforded the patient so much relief that fearing a return of her previous symptoms, she objected to its discontinuance.

Since then Westermann has successfully employed permanent gastric drainage in fifteen cases.

The technique of this procedure is easy. Where the pharyngeal reflex is exaggerated, the mucous membrane of the throat is anesthetized; the tube, 2 meters long, is introduced through the nose for a distance of 50 cm., being fixed in place by a heavy silk thread. The free end of this tube is provided with a funnel, and empties itself into a vessel placed on the floor beside the bed. The intestinal gases often interrupt the outflow. During the first day, a test as to whether or not the siphon is properly working is to be made every half hour. If not, siphonage is reëstablished by filling the elevated funnel and depressing it anew. With proper care, vomiting will not recur. Further, the patient is made much more comfortable by being allowed to drink all he wishes; as very little fluid is then absorbed, most of it promptly escaping by way of the tube, proper administration of fluids by other means is indicated. The tube has a diameter of one-half a centimeter, and should not be too thin walled. Westermann refers to the use of this procedure by Tarnier, in 1888, for feeding weak nursing infants, and by Scheltema, in 1907, for reaching parts of the alimentary tract otherwise inaccessible except through operation. Brewer has used the permanent tube for feeding, after extirpation of the larynx.

Kappis¹ (of Anschütz's clinic) reports very favorably upon the use of the permanent stomach tube, as suggested by Westermann. The advantages claimed for this method, were fully substantiated by him in about ten cases of postoperative ileus. The vomiting and eructations ceased promptly and permanently; the danger from aspiration of vomited matter was consequently averted; by emptying the stomach, the heart and lungs were once more afforded opportunity for unhampered action; restlessness and anxiety, so characteristic of postoperative peritoneal illness, were set aside entirely. Even in far-gone, hopeless cases where they ultimately died, the patients were made more comfortable. The freedom to drink unlimited quantities of fluid added enormously to the patient's comfort.

But one drawback of the method has so far been discovered, a pressure sore of the esophagus was found at autopsy upon a patient in whom the tube had been in place for forty-eight hours, and some transient soreness in swallowing followed the removal of the tube in several other cases. Kappis, therefore, advises that the tube be kept in place not longer than twelve hours. In spite of this disadvantage, the method deserves widespread adoption.

¹ Münch. med. Woch., 1911, No. 1, p. 15.

Chronic Gastromesenteric Ileus. Stavely¹ describes a case of this condition. The patient suffered from pain in the abdomen and vomiting, occurring in attacks which always followed the taking of food, irrespective of its quality. She was obstinately constipated. The distention of the stomach occurred immediately after taking food, and in some twenty of these attacks became so extreme that she lost consciousness. At operation, December, 1907, the stomach was found distended with gas. The duodenum was distended to about three inches in diameter, up to where it passed beneath the mesenteric ligaments, which could be seen by raising the transverse colon, and below, the small intestines were contracted. An opening was made through the posterior peritoneum, a part of the duodenum was drawn through and anastomosed, in front of the mesenteric ligaments, to the jejunum about a foot from its origin. Stavely reports "at the present time she is entirely free from gastric distention and pain, can eat any kind of food without discomfort, and has gained in weight. She can be considered cured."

Gastric Hemorrhage. Finsterer,² from v. Hacker's clinic, considers that the surgical indications regarding the treatment of hemorrhage from the stomach, which were furnished by Leube and v. Mikulicz, taken all in all, still hold at the present time. Briefly stated, these are: That a single acute gastric hemorrhage should be treated by medical means, putting the stomach absolutely at rest, but if repeated, or if slight chronic hemorrhages recur, operative measures are indicated. At one time it was thought that gastro-enterostomy had a curative effect, but after a number of cases in which this was done had been collected, it became apparent that in an unexpectedly large proportion, the bleeding continued in spite of this procedure. In some of these, the bleeding stopped after a while, and the patients recovered; while in others it persisted until death supervened.

Even before gastro-enterostomy as a hemostatic measure came into vogue, direct ligation of the bleeding point was attempted, but this fell into disuse because of the difficulty encountered in locating the exact source of hemorrhage. Very often it was found impossible, much time having been lost in a long-continued, futile search, so that positive harm and no good was done the greatly weakened, anemic patient. On this account, the large, deep ulcers have been the only ones that were easily found. The small, pin-point, bleeding spots, hard to find even at autopsy, gave no indication of their site on the external surface of the stomach, and because of the slight chance of their discovery by surgical means, they were wisely left to be treated by medical measures. According to Krafft,³ these small acute ulcers almost never

¹ Surgery, Gynecology, and Obstetrics, September, 1910, p. 288.

² Beiträge z. klin. Chir., Band lxxv, Heft 3.

³ Langenbeck's Archiv, Band xciii, Heft 3, p. 557.

occur at the pylorus or on the curvatures. They are usually found on both surfaces of the stomach; they may be either single or multiple; hemorrhage from them issues by a hole in the side wall of one of the larger arterial branches lying in the mucosa or submucosa; and, up to within recent times, no method has existed for accurately determining their location. Rovsing, in 1908, first suggested direct *gastroscopy* and *diaphanoscopy*. The technique of the procedure was as follows. The abdomen was opened and the stomach delivered. At a point half way between the greater and lesser curvatures and 5 cm. from the pylorus, an incision 1 cm. long was made in the stomach wall. Through this opening a gastroscope—to all intents and purposes a large cystoscope—was introduced. After introduction of the instrument, a purse-string suture which surrounded the opening was drawn tight. Escape of gastric contents was thus prevented and inflation became feasible. By this means tumors, bleeding points, etc., could be located and inspected.

A short résumé of Krafft's five cases, in which the instrument was used, may serve to illustrate its true value:

Case I. Operated February, 1908, for gastric hemorrhage. Hemoglobin had fallen from 55 to 28. At laparotomy, nothing abnormal was visible on the exterior of the stomach and duodenum. Palpation also revealed nothing. Diaphanoscopy showed a reddish-brown spot the size of a pea upon the anterior surface of the stomach, not far from the lesser curvature, some 10 cm. from the pylorus. A vessel from the lesser curvature led down to this spot and stopped there. Gastroscopy showed that the spot seen by transillumination was a blood clot partially covering a small ulcer. A quantity of bloody fluid contained in the stomach hindered a good view of its interior. In spite of this difficulty, the rest of the mucosa lining the stomach and upper duodenum could be well inspected and was found to be normal. The vessel leading to the ulcer was ligated by a hemostatic suture perforating all coats. The patient made an uninterrupted recovery, and was perfectly well two years later.

Case II. Had repeated severe hemorrhages from the stomach with severe anemia. At laparotomy, inspection and palpation of the exterior of the stomach failed to reveal the site of trouble. Diaphanoscopy of the anterior wall was negative; thereupon the stomach was turned upward and through an opening made in the transverse mesocolon, illumination revealed a large vessel from the lesser curvature which ended in a dark area of considerable size. Under guidance of the light, this vessel was ligated. At this moment, in some unknown way, a short circuit of the street current of some 220 volts, occurred. The patient suddenly became stiff, and the stomach became very hot to the hand holding it. The current was immediately turned off, and the gastroscope withdrawn. Apparently steam had been generated in the stomach, for upon withdrawal of the instrument a large amount of bloody gastric

contents gushed out, causing an extensive soiling of the operative field. The stomach showed a burnt necrotic area, 8 cm. in diameter, around the hole through which the gastroscope had been introduced. Besides this there were several other scorches. The necrotic burnt areas were buried with Lembert's sutures, and matters were patched up as well as possible. The pulse and temperature steadily increased after operation, and the patient died thirty hours after the accident. At autopsy the vessel which had been ligated was found leading to an ulcer half the size of a pea. There were parenchymatous changes in the other organs.

Case III. History similar to those previously given. Nothing could be seen or felt upon eventration of the stomach. Diaphanoscopy was difficult because of strong sunlight in the operating room. A suspicious spot was indistinctly made out by transillumination, which gastroscopy revealed to be a small ulcer (where, was not stated). The vessels leading to this were ligated by perforating hemostatic sutures, and these were buried by a purse-string Lembert stitch. Recovery.

Case IV. Passage of the stomach tube just before operation showed the presence of a quantity of fresh blood. Nothing was seen or felt upon eventration of the stomach. Diaphanoscopy demonstrated a vessel ending in a dark spot on the posterior surface of the stomach, which could be seen through the thin, gastrocolic ligament. Gastroscopy revealed there an ulcer the size of a pea. A hemostatic suture of the vessel was made, penetrating all coats, and was buried by a purse-string Lembert. Recovery.

Case V. The only noteworthy points were that a thickened pylorus was discovered, which, however, showed nothing abnormal either by transillumination or by gastroscopic inspection. A pin-head ulcer on the anterior wall was found, and attended to. Uninterrupted recovery.

The following details of technique are worth remembering. In Krafft's earlier cases, he found the presence of dark, bloody, gastric contents greatly hindered the obtaining of satisfactory results; therefore, he washes out the stomach just before operation and thereby obtains a clear view of its interior. So far as he knows, this does not increase the bleeding to any extent.

After introduction of the gastro-diaphanoscope and inflation with air, the stomach resembles a Chinese lantern.

The views obtained by transillumination are to be interpreted as follows:

A vessel which is seen to run along and stop in a dark spot, and which is not continued beyond this, may be considered as leading to an ulcer upon which a clot has formed.

If a vessel seems to cease suddenly in its course, with no dark spot to mark the point of cessation, it is probably bleeding. If, upon tying a hemostatic suture, the portion beyond it ceases to be visible, one may

be certain that the vessel was bleeding, and has emptied itself beyond the ligature.

If a vessel, after ligature, appears unchanged, it can be considered thrombosed.

On account of the variable depth at which the vessels may lie, a through-and-through hemostatic suture is used which, of course, is buried afterward.

Rovsing, in discussing Kraft's paper, stated that he had not had the opportunity of finding any bleeding points in the stomach, but that, in 3 cases, he had found the source of hemorrhage by introducing the instrument through the pylorus into the duodenum.

Göbell, in discussing the subject of gastric ulcer before the Deutsche Gesellschaft f. Chirurgie, April, 1910, states that he has found the employment of Rovsing's method of diaphanoscopy to be of marked service. For this purpose he has used an old-fashioned cystoscope, which he introduces through the opening which will eventually be enlarged to form part of the stoma of a posterior gastro-enterostomy. He states that he has been able to ascertain whether one or more ulcers were present. In one case, he was also able to determine that there was no hemorrhage from the stomach, but that the source of bleeding lay in the duodenum.

The following series of statistics of Borszecky and Finsterer, regarding the operative results in gastric hemorrhage, are quoted by Kraft:

	No. of cases.	Died.	Mortality.
Gastrotomy	7	5	71 per cent.
Gastro-enterostomy	23	12	52 "
Cauterization of the ulcer	5	2	40 "
Excision	19	5	26 "
Ligature	16	3	19 "

Digital Exploration of the Stomach.—In some cases of gastroduodenal ulcer it is not possible to locate the site of the lesion, even after the abdomen has been opened. Wilms¹ has successfully explored the stomach and duodenum under such circumstances by cutting a small opening in the stomach wall near the pylorus, inserting the index finger, covered with a finger cot, and thus ascertaining the location and number of the ulcers. A purse-string suture passed previous to opening the stomach is drawn tightly around the finger and prevents escape of gastric contents. In two cases, the ulcer lay close to the pyloric ring, and, in another case, it was situated 5 cm. from the pylorus on the posterior, upper wall of the intestine.

Transgastric Removal of Adherent Callous Ulcers. Ulcers of the posterior gastric wall are difficult of access. W. J. Mayo,² reports a successful and ingenious method of attack. A callous ulcer of the posterior body

¹ Münchener med. Woch., 1910, No. 13.

² Annals of Surgery, December, 1910, p. 797.

of the stomach was exposed and extirpated through an incision in the anterior wall of the stomach. His procedure was the result of "an immediate necessity to meet an accidental complication." . . . "A calloused ulcer of the posterior wall of the stomach was found about 4½ inches above the pylorus, adherent to the pancreas, which formed the ulcer base. An opening was made through the gastrohepatic omentum, and an attempt was made to separate the ulcer from the pancreas, hoping thus to bring it into view through the opening in the gastrohepatic omentum and excise it, or to perform a resection in continuity. These manipulations resulted in partially separating the ulcerated surface posteriorly, with immediate leakage of the stomach contents into the lesser cavity of the peritoneum. The gastric opening was plugged with a finger, the gastrocolic omentum was opened below, and, with some difficulty, adequate protection was secured about the ulcer. It was impossible to get a view of the ulcer either from above or below, therefore, the anterior wall of the stomach was opened to the extent of 3½ inches in its long axis, and by retraction of the margins of the opening, a splendid view of the ulcer was obtained. The ulcer was excised with a knife, leaving it attached to the pancreas, from which situation it was shaved off cleanly. The cut margins of the posterior walls of the stomach were sutured from the mucus side by means of a running suture of heavy linen thread applied transversely to the long axis of the gastric cavity. The anterior wall of the stomach was closed with chromic catgut and linen. An attempt was then made to apply a peritoneal suture behind to cover the row which had been applied from the mucous surface. It was quickly seen, however, that serious damage would result in an attempt to secure the necessary exposure. Further examination revealed that the single through-and-through suture, which had been applied from the mucous surface, made a most satisfactory union without reinforcement. Three drains, composed of rows of rubber tissue, were passed behind the stomach to the line of sutures to cover the site on the pancreas where the ulcer had been excised. These drains were brought out through the upper angle of the abdominal incision. There was no leakage or drainage and the patient made a prompt and permanent recovery."

The transgastric operation for removal of adherent calloused ulcer of the posterior wall of the body of the stomach has been performed by the Mayos five times. The routine procedure which has developed is as follows: "The gastrohepatic and gastrocolic omenta are opened above and below the ulcer. Gauze protection is introduced, adhesions are carefully separated, and, if possible, the ulcer surface is cut free from the posterior attachments without opening the stomach. A piece of gauze is packed into the denuded area behind, and, in all but one of the cases, this temporary pack was adequate to stop hemorrhage without the ligation of vessels. The anterior wall of the stomach is opened, and,

with the fingers behind, the entire ulcerated surface is pressed through the anterior incision and the ulcer excised (Fig. 43). The gap is sutured with through-and-through sutures of chromic catgut from the mucous side transversely, and this suture line is further protected by several mattress sutures of linen applied from the mucous side to prevent separation due to the early absorption of the catgut (Fig. 44). The anterior wall of the stomach is then closed. Several rubber tissue drains are carried down behind the stomach and brought out at the upper end of the abdominal wound as a safeguard."

Pilcher¹ reports having performed this operation with success.

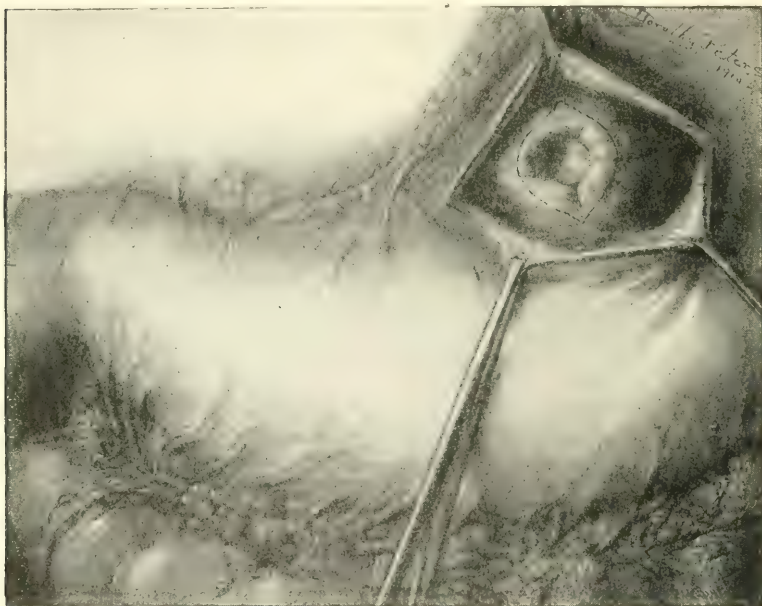


FIG. 43.—Transgastric excision of calloused ulcer of the posterior wall of the body of the stomach, showing anterior wall of the stomach open and the ulcer exposed. The dotted lines show proposed site of excision. (Mayo.)

Callous Ulcer of the Stomach. During the past year attention has been called by authors, both here and abroad, to the great tendency of callous gastric ulcer to carcinomatous change. Wilson and MacCarty, as reported in *PROGRESSIVE MEDICINE* of June, 1910, have shown that in 71 per cent. of resections for carcinoma, a preëxisting callous ulcer could be demonstrated. This was in a series of 153 cases. At the meeting of the *Deutsche Gesellschaft für Chirurgie*, in the spring of 1910, Ewald stated, in discussing Payr's report that 26 per cent. of gastric ulcers underwent malignant change, that he considered this estimate far too

¹ Long Island Medical Journal, 1908, p. 187.

low. In Germany, the trend of opinion seems to be developing in this direction. In France, an experience of Tuffier¹ bears out this point. He found an induration of the greater curvature, the size of a nut, with two slightly enlarged lymph nodes in the great omentum near by. The impression gained was that of a chronic ulcer. It was resected, and the nodes extirpated. Microscopic examination revealed a typical callous ulcer, at the base of which a carcinoma was beginning to develop. From



FIG. 44.—Ulcer excised, and the through-and-through mucous suture partially completed. (Mayo.)

this experience he concludes that every gastric ulcer which is solitary, and which is easily accessible, should be extirpated. Many other surgeons have emphasized the impossibility of distinguishing malignant from inflammatory tumors of the stomach by gross examination.

The general trend of opinion seems to be leading to this, that gastric ulcer situated in the body of the stomach, but not yet causing

¹ Bull. et Mém. de la Soc. de Chir. de Paris, tome xxxv, p. 739.

stenosis, is not cured by gastro-enterostomy. Resection, when possible, should be done, not only because the ulcer is not cured by gastro-enterostomy, but mainly because its continued existence is a constant menace as regards the probability of a change to carcinoma.

Gastric Diverticulum following Operative Procedure. Pedro Chutro¹ reports the case of a patient, aged twenty-seven years, who was operated upon for an echinococcus cyst through an incision made in the epigastrium. A fistula remained, requiring a year to heal. Several months after the closure of the fistula, the patient returned, complaining of renewed epigastric pain upon exertion. A tumor the size of a mandarin orange appeared in the operative scar, disappearing as soon as effort ceased. A second operation showed this to be a true diverticulum of the stomach. In closing the peritoneum at the first operation, the stomach wall had been embraced in the suture, and had led to a firm adhesion with the anterior abdominal wall. As the hernia developed and the adhesion did not give way, the stomach wall yielded locally and formed a diverticulum.

Pyloric Stenosis Due to Aberrant Pancreatic Tissue. P. Reynier and Masson² tell of a man suffering for several years with severe gastric disturbances, suggestive of pyloric stenosis. At operation, a small tumor was found at the pylorus. Resection was performed. Examination of the specimen showed that there had been a valve-like projection of the tumor into the lumen. On section, the tumor proved to be aberrant pancreatic tissue, lying between the muscularis and the mucosa.

Recent Tests for Carcinoma of the Stomach. In spite of the numerous clinical tests which have recently sprung up and which are being tried out in the laboratories, we seem as far distant as ever from an accurate means of diagnosing malignant neoplasm of the stomach in its early stages. Prominent among recent processes are Neubauer and Fischer's *glycyltryptophan test*, the *acetic acid test*, the *antitrypsin reaction*, *Ascoli's meiotagmine reaction*, the *hemolytic reaction*, and others. They are all of great scientific interest, but so far have proved of little value to the practitioner.

Unilateral Pyloric Exclusion. Von Eiselsberg³ states that a gastric ulcer is not entirely put at rest by the usual gastro-enterostomy. On account of this, for the past sixteen years he has practiced unilateral pyloric exclusion. This consists in division of the stomach to the cardiac side of the ulcer or tumor, and suture of the divided ends. To the 2 cases published at that time he has added 10, with good results in all except one, in which the patient died ten months after operation from hematemesis. Inasmuch as other operators have obtained good results with the same procedure, he recommends that this be performed when doubt exists in the surgeon's mind whether resection should be

¹ Revista de la Soc. Med. Argentina, 1909, p. 382.

² Bull. de l'Acad. de méd., 1909, No. 30.

³ Wiener klin. Woch., 1910, Heft 2.

performed, or in cases where resection is not feasible. In other words, it is indicated when the poor condition of the patient, or the presence of adhesions make resection dangerous or impracticable. It is also indicated in those cases in which there is doubt regarding the nature of the tumor existing and where for apparent reasons one cannot resect. Naturally, this is applicable to cases of pyloric involvement only. There is no doubt that as soon as the ingesta no longer come in contact with the carcinoma, taking it for granted that one exists, its rate of growth will be materially lessened. In cases of gastric ulcer more rest is afforded for the parts than in simple gastro-enterostomy. It may be pertinent to make the following remark at this point. It occasionally happens that when gastro-enterostomy for ulcerative pyloric obstruction has been performed and when, as a result, the ulcer has subsided for a while, the food will begin to pass again through the pylorus, and a stenosis of the gastro-enterostomy opening will take place. Should the ulceration recur at the pylorus, then the stomach will have two insufficient stenotic communications with the alimentary tract below. This cannot happen where the unilateral pyloric exclusion of v. Eiselsberg had been performed. Von Eiselsberg thinks this procedure may also serve as a preliminary step to a resection to be carried out at some later occasion.

Recent Opinions about Peptic Ulcer of the Jejunum following Gastro-enterostomy. Von Roojen¹ has collected 89 cases of this condition from the literature. Seventy-nine per cent. of these occurred in males. They were not confined to any special age. Most of the previous gastro-enterostomies were performed on account of benign pyloric stenosis. An exception to this was a case of Lennander's, in which a jejunal ulcer developed after a gastric resection for carcinoma. The complication has been observed after all types of gastro-enterostomy, occurring in about equal proportions after anterior and posterior methods. In a few instances the ulcer has developed immediately following operation, while in others, a long period of time passed before the appearance of new symptoms. In a large majority of the cases the recurrence took place within two years. *The situation of the ulcer, in over one-half of the cases, was at, or close to, the stoma.* As in gastric ulcer, the clinical course varied; in some instances, acute perforation followed; in others, the disease took a very chronic course, leading to the formation of adhesions with the abdominal wall or the colon. Sometimes inflammatory masses developed, leading to the establishment of fistulæ between the small and large intestine, or to a perforation externally through the abdominal wall. The latter condition was observed only after anterior gastro-enterostomies, evidently being due to the proximity of the anastomosis to the anterior abdominal parietes. According to v. Roojen,

¹ v. Langenbeck's Archiv, Band xci, Heft 2, p. 381.

injury of the intestine at operation, in the form of blunt trauma, or from cutting instruments, played a leading part in the etiology. As in the different forms of gastric ulcer, the surgical treatment of gastrojejunal ulcer is determined by the conditions found in individual cases. In certain instances even jejunostomy may be indicated for the sake of putting the stomach at rest. Von Roojen advises, as a prophylactic measure, that great care should be taken to avoid injury to the gut during operation, and that a long course of antacid diet should follow.

(Von Roojen had also discovered three cases of peptic jejunal ulcer in which no operation had been previously done.)

William J. Mayo¹ states that an investigation had been made of all cases in which gastrojejunostomy had been done in St. Mary's Hospital, Rochester, Minn., to ascertain, if possible, whether jejunal ulcer had followed as a secondary effect. Out of 1141 gastrojejunostomies, 715 were performed for duodenal and gastric ulcer, 167 for carcinomatous obstruction at the pylorus, and 259 in connection with partial gastrectomy, most of the last named being performed for malignant disease.

He says: "Of the whole number, as far as any knowledge could be obtained, not a single case developed jejunal ulcer; nor have any such cases of jejunal ulcer come to our clinic, in which gastrojejunostomy had been performed by other surgeons.

"It must be admitted that we might not have recognized a jejunal ulcer had we encountered one, and it is possible that some of the cases, in which symptoms continued after operation, were due to an undiagnosed jejunal ulcer; it is also possible that some of our patients may have fallen into the hands of other surgeons who have found and operated upon them for this secondary condition."

He agrees with Paterson, that ulcers occurring in the jejunum after gastro-enterostomy are the result of altered physiological conditions produced by the operation, and that gastrojejunal ulcers found in the line of anastomosis, probably occur as a direct consequence of operation. In fact, he says: "I believe that we should view most gastrojejunal ulcers as due to technical failures in the operation itself, rather than as an unavoidable condition which, up to the present time, true jejunal ulcer appears to be." He reports 3 cases of the gastrojejunal type occurring at the site of anastomosis. In the first case, the ulcer occurred about three years after gastro-enterostomy had been performed for a callous ulcer at the pylorus, by means of Murphy's button. In the floor of the ulcer, which was hard and smooth, a projection at the point of undermining proved to be a silk suture protruding into the gastro-intestinal cavity. In the second case, gastro-enterostomy had been performed seven months previously by another operator. The retention of infected suture material led to the development of an ulcer. The third case, a posterior no-loop suture gastrojejunostomy for a large

¹ Surgery, Gynecology, and Obstetrics, March, 1910.

duodenal ulcer, was operated upon about two and one-half years later for gastrojejunal ulcer, the result of an infected hematoma.

Maylard¹ tells of a woman, aged fifty-one years, who was operated on for a perforated gastric ulcer in February, 1907. The perforation was on the anterior wall of the stomach near the pylorus. It was half an inch long and a quarter of an inch wide, situated at the centre of what appeared to be a large ulcer. This opening was closed by suture, followed by fixation of some omentum over the suture line. An anterior gastro-jejunosomy was then made. Why this method was employed rather than the posterior one, Maylard does not remember. Eight months later a second operation was performed for a perforation which was found on the anterior surface of the distal limb of the jejunum, one and one-half inches from the gastrojejunal orifice. The perforation was closed. Recovery. Two years later a third operation was necessitated by the occurrence of a perforation in the efferent limb of the jejunum, an inch or so below the site of the previous one. Maylard laid particular emphasis upon the fact that these lesions were not at the suture line.

Schwarz² reports 3 additional cases of "penetrating jejunal ulcers." They were all in men, and all communicated with the anterior abdominal wall. Further, all had had an anterior gastro-enterostomy for benign pyloric stenosis, with entero-anastomosis, and in all of these the ulcer developed in that part of the jejunum lying between the gastro-enterostomy opening and the point of entero-anastomosis—apparently because in this region neutralization of the gastric juice by means of the intestinal fluids was lacking. Schwarz states that in a large number of posterior gastro-enterostomies he has never observed a jejunal ulcer.

The remarks of von Eiselsberg regarding gastric ulcer and its allied conditions, made at the *Naturforschermin-versammlung*, September, 1910, are so interesting that it is well to epitomize them. He tells of a case with the following history: A tinsmith, aged forty years, was operated upon in November, 1909, for pyloric stenosis due to a large callous ulcer extending into the duodenum. Pyloric exclusion and posterior gastro-enterostomy were performed. At first, convalescence was uneventful. However, three weeks later a tumor developed in the stomach region accompanied by signs of a mild peritonitis. Finally, about two months after the operation, acute symptoms occurred which warranted immediate laparotomy. There was a perforation of the jejunum just below the site of the gastro-enterostomy, and a second perforation was found in the transverse colon at a point near the first one. The jejunal perforation was closed with a tab of omentum, and inasmuch as an extensive callous tumor involved the entire gastro-enterostomy site and could not possibly be removed, an anterior gastro-enterostomy with entero-anastomosis was performed to relieve obstruction. The patient died

¹ *Lancet*, 1910, vol. i, p. 497.

² *Beiträge zur klin. Chirurgie*, Band lxvii, 1910, Festband für Wölfler.

the next day. At autopsy, three more ulcers, besides those just described, were found in the efferent loop of the jejunum, close to the site of the first gastro-enterostomy. They had almost perforated. It is interesting to note that the callous pyloric ulcer which had furnished the indication for the first operative procedure (gastro-enterostomy and pyloric exclusion) had healed completely.

Besides this case, von Eiselsberg reported having seen 2 others in which there was secondary inflammatory tumor-formation following gastro-enterostomy. In still another instance, a gastrocolic fistula was found about five and one-half years after a previous gastro-enterostomy. The openings were closed by suture, with the result that at least a temporary freedom from untoward symptoms was obtained. In another case in which posterior gastro-enterostomy for recent ulcer had been performed six months previously, the patient returned at the end of that time with symptoms demanding a second laparotomy. A large callous ulcer was found exactly comprising the gastrojejunal opening. The entire inflammatory mass was excised, and a new gastro-enterostomy was performed.

Recovery.

Besides these, there were four cases of secondary stenosis of the stoma following gastro-enterostomy for ulcer. Altogether, peptic ulcer was observed 8 times as a postoperative sequel in over 600 operations upon the stomach. In all 8 of these, hyperchlorhydria was present. Eiselsberg believes there is no doubt that its presence plays an important part in the causation of these ulcers. However, he considers it doubtful whether hyperchlorhydria is more than a predisposing etiological factor; otherwise peptic ulcer after gastro-enterostomy (for ulcer) would occur far more frequently. He believes that the (as yet undiscovered) cause which in the first instance leads to the production of a gastric ulcer, is not eradicated by gastro-enterostomy. Consequently it may bring about the formation of new ulcers. Among important predisposing individual factors were arteriosclerosis, the presence of superabundant adenoid tissue in the stomach and small intestine, septic conditions, and retrograde emboli resulting from contusion of the intestine during operation. To these should also be added lack of proper hemostasis, undue tension upon the gut, and failure to establish exact apposition of the mucosa. Secondary narrowing of the stoma was possibly a consequence of failure to make a sufficiently large opening at the time of operation, especially where the indications for its establishment were only relative. As a rule, however, it resulted from the development of a peptic ulcer there.

Unfortunately it is not possible at the present time to indicate how the occurrence of ulcer after gastro-enterostomy is to be prevented. Of course, it is always possible to neutralize excessively acid secretions with bicarbonate of soda, and to regulate the diet for a long time after operation. Perhaps the administration of atropine may prove to be of some use.

Gastro-enterostomy should be established at a point on the stomach wall as far removed from the ulcer as possible, as Kocher's experience has shown that gastro-enterostomy *en Y* is followed with relative frequency by the development of peptic ulcer. Von Eiselsberg, therefore, holds that this method should be entirely forsaken. He does not agree with the proposal of von Roojen, who, on account of possible trauma, avoids every instrumental compression of the stomach and intestinal wall at operation. He opposes it because it involves the danger of soiling the peritoneum by the escape of gastric contents.

The cases reported recently by Spassokukozki¹ and Battle² are interesting, but add nothing new.

In his excellent book upon the medical and surgical treatment of chronic gastric ulcers, Bamberger states that the development of peptic ulcer of the jejunum is not necessarily dependent upon the presence of hyperacidity. He believes the normal gastric juice is capable of causing this, provided disturbances of circulation in the intestinal wall exist. Like von Roojen, he insists that all individuals who have had a gastro-enterostomy done must continue to exercise great care in their diet.

Gastric Function after Gastro-enterostomy. Axel Blad³ tested the stomach's function in 20 cases of gastroduodenal ulcer some time after gastro-enterostomy had been performed. These cases had been carefully observed previous to operation. The result of his studies showed that in half of the cases, the ability of the stomach to empty itself had not been improved; in fact, in a few instances the motility was still further lessened. On the other hand, an improvement in the ability of the stomach to empty itself occurred only when marked pathological changes at the pylorus were present. The cases with a free pylorus did not show these good results. In spite of unimproved motility, however, the patients with hyperacidity showed improvement, whereas those with achylia did not.

Ribas y Ribas and Comas y A. Prio⁴ have made *x*-ray studies of the gastric function at varying periods of time following gastro-enterostomy. According to this, there are three types: (1) Stomachs in which a powerful and rapid contraction takes place as soon as the bismuth meal has entered, thereby forcing it through the new opening. These stomachs, however, tire soon. (2) Stomachs in which contraction is delayed from twenty to sixty minutes after ingestion, but when it once starts, effects a thorough and complete emptying. (3) Stomachs which begin their work from one-half to three hours after the meal has been taken, and empty themselves with weak contractions.

¹ Russki Wratsch, 1909, reported in the *Centralb. für Chir.*, 1910, p. 354.

² *British Medical Journal*, April 23, 1910.

³ *v. Langenbeck's Archiv*, Band xcii, Heft 3.

⁴ *Barcelona*, May, 1910.

Edema of the Lower Extremities following Gastro-enterostomy. Jianu, of Jonnesco's clinic, describes 3 cases of edema of the lower extremities which came on several days after operation. A brief résumé of the cases is as follows:

I. Man, aged forty-eight years; chloroform narcosis; exclusion of the pylorus; posterior gastro-enterostomy.

II. Man, aged forty-five years; form of anesthesia not stated; pyloric exclusion, with posterior gastro-enterostomy.

III. Man, aged twenty-eight years; a stovaine-strychnine (0.08 mg. and 0.001 mg.) spinal anesthesia. Posterior gastro-enterostomy.

Jianu states that the edema in these cases was not the consequence of a kidney lesion, for there were present neither albumin nor casts, nor other clinical symptoms of such trouble. He ascribes it, instead, to the retention of chlorides, due to an excess of these in the fluids and food administered shortly after operation. He maintains this hypothesis because a milk diet, carried on for two or three days, sufficed to reëstablish the balance of chloride metabolism; and, further, because when, several days later, an excess of chlorides was again given, edema did not reappear. In his opinion, had kidney lesions existed, this would surely have promptly recurred.

THE INTESTINES

A Method of Closing the End of a Divided Intestine. Klapp¹ recommends that the intestine first be crushed and then divided with the Paquelin cautery; after this a long narrow clamp is to be applied to the end

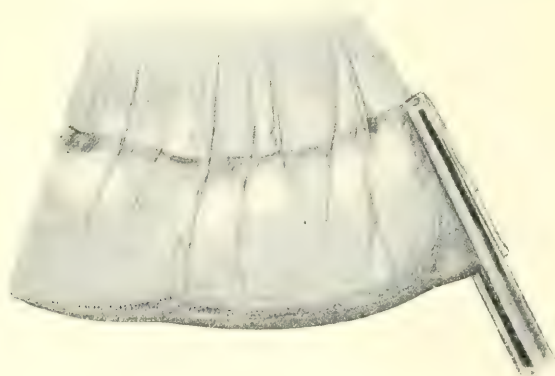


FIG. 45.—Klapp's method of closing the end of a divided intestine.

(Fig. 45) of the intestine, which is then rotated in the transverse axis of the gut upon itself. As this is done, the mucosa disappears from view and the serosa of the "roll" begins to come in contact with the

¹ Deut. Zeitsch. f. Chir., 1910, Band cv, p. 559.

serosa of the adjacent intestinal wall (Fig. 46). Sutures are then passed. By this means an extensive adhesion of serous surfaces is obtained, and pressure arising within the intestine does not exert its force directly against the line of closure. Not only has this been successfully carried out upon animals, but it has been employed with satisfactory results in two cases of closure of the duodenum in the Billroth II operation, in three resections of the large intestine, and in numerous procedures upon the small intestine. It has also been used in closing the appendicular stump.



FIG. 46.—Klapp's method of closing the end of a divided intestine.

The Amount of Small Intestine it is Safe to Resect. Axhausen¹ publishes the case of a young woman in whom 475 cm. of gangrenous small intestine were removed, following a volvulus of the small intestine. Recovery. Examination of this patient's metabolism showed that the assimilation of fats and proteids was markedly diminished, whereas resorption of the carbohydrates was not apparently affected. There was no gain in weight during the twelve weeks the patient was under observation. This was probably due to the presence of an active pulmonary tuberculosis accompanied by fever. Other authors report the removal of even greater lengths of small intestine (from 510 cm. to 540 cm.). In these cases, however, it was not known how much small

¹ Mitteil. a. d. Grenzgeb. d. Med. u. Chir., Band xxi, Heft 1.

intestine had been left behind. Inasmuch as its normal length varies between 4 and 8 meters, a sufficient length might have remained.

In determining the amount of intestine which it is permissible to remove, the relative proportion, not the actual length resected, should be our guide. In Axhausen's case, he was able actually to measure the amount of small intestine left behind in the belly. This was 125 cm. in length, so that in his case 80 per cent. of the small intestine was resected. From this it may be gathered that resection of about four-fifths of the small intestine represents the limit of what is physiologically permissible.

Pneumatosis Cystoides Hominis. Wasiljew¹ recounts the following interesting case: A patient, whose appendix had been extirpated some six months before, came to operation for renewed trouble in the right iliac fossa. There were no adhesions, but the lower end of the small intestine exhibited numberless small blebs containing gas, lying just beneath the peritoneum, which disappeared upon pressure. Seven centimeters of the diseased intestine were resected. Uneventful recovery, with subsidence of symptoms. Pathological report upon the specimen obtained, showed that the mucosa was unchanged; the submucosa was thickened, and was the site of many hollow spaces containing gas; the muscularis was relatively unchanged, and the major portion of the gaseous blebs were found in the serous layer. Of the 19 cases which Wasiljew was able to collect, his own showed the least extensive involvement of the intestine. He believes, therefore, that his case shows the earliest stage, so far observed, of this condition. From microscopic studies, he considers the process to be a proliferating lymphangitis, and leans to the opinion that the gas in the lymph spaces is the cause of inflammation and that the disease is of parasitic origin.

Methods for Closing Intestinal Fistulæ. Kappis² recalls the value of using a T-tube in closing fistulæ situated high up in the small intestine. He tells of a case in which such a fistula leaked, permitting free escape of intestinal contents. The patient was rapidly going down hill when a T-tube was inserted and was held in place by gentle traction. This effected an absolute mechanical closure and the patient went on to rapid recovery. In a second instance, the fistula was so large that the posterior wall of the gut prolapsed through it. This condition also was successfully relieved by the use of the same procedure. Anschütz spoke of the method (at the Vereinig Nordwestdeutsch. Chirur.) on August 3, 1909. It is an adaptation of the same principle which has been employed by Kehr in draining the bile passages (hepaticus drainage), and by Clairmont for closure of an artificial anus.

Schmiz³ reports the successful use of Trendelenburg's position in

¹ Cit. Centralb. f. Chirur., 1910, No. 16, p. 594.

² Münch. med. Woch., 1911, No. 1, p. 15.

³ Deutsch. med. Woch., 1910, No. 1.

the cure of a fecal fistula of the cecum. In this posture the opening in the cecum lay higher than the ileocecal junction, and, by gravity, the fluid intestinal contents naturally flowed downward toward the hepatic flexure. This placed the fecal fistula at rest, allowed its sides to become approximated, and finally to unite.

Volvulus of the Cecum was reported in *PROGRESSIVE MEDICINE* of 1910. Speck¹ published one case occurring in a girl, aged eighteen years, who was relieved of this condition by operation, but died six weeks afterward of pulmonary tuberculosis. Besides this, two additional cases are reported by Lapeyre,² occurring at the ages of forty-eight and seventy-three years respectively. Both patients died of peritonitis. Both came late to operation.

A Rare Case of Incarceration of the Small Intestine within a Prolapse of the Posterior Wall of a Cecal Fistula. Usteri³ gives an account of a woman, aged sixty-seven years, in whom a fecal fistula of the cecum had to be established on account of intestinal obstruction. Four years later a prolapse of the posterior cecal wall took place, forming with its serous surface what practically amounted to a hernial sac with a narrow neck, which at the time of its development contained a loop of small intestine. This promptly became strangulated, resulting in gangrene, peritonitis, and death. Extensive prolapsus recti, carrying along with it loops of small intestine which form part of the protruding tumor, is a condition to which the one we have just described is analogous.

Acute Primary Typhlitis. Röpke⁴ reports 4 cases of this rare malady, in which laparotomy was performed for supposed acute appendicitis, and in which an acute primary typhlitis proved to be the essential malady. After a short review of the literature dealing with the few cases of this condition so far recorded, Röpke discusses its etiology. It is noticeable that in several instances the inflammatory process affected the lateral portion of the cecal wall opposite to the point of entrance of the blood and lymph vessels. Naturally a differential diagnosis between acute appendicitis and acute typhlitis is impossible without a probatory incision.

Perforating Ulcer of the Ascending Colon. Zickler⁵ tells of this extremely rare condition. A young woman, aged twenty-five years, was operated upon for acute appendicitis. A diffuse suppurative peritonitis was found, due to perforation of the ascending colon. Zickler believes that an ulcer simplex of the colon had been present—a form of ulceration which Quenue and Duval have recently studied. Of the 27 cases which they collected, only four were found in the ascending colon.

¹ Cit. Centralb. f. Chirur., 1910, p. 594.

² Ann. Internat. d. Chirurgie Gastro-intestinal, 1909, No. 4.

³ Deutsch. Zeitsch. f. Chir., Band ciii, p. 167.

⁴ Langenbeck's Archiv, Band xci, Heft 1.

⁵ Beitr. z. klin. Chir., Band lxxvii, 1910. Festband f. Wölfler.

Perforation was present in 19 of these patients, but only 1 recovered. The case of Zickler's is the second one in which recovery has taken place, although it must be said that three operations had to be performed before a cure was accomplished, in the last of which 10 cm. of large intestine were resected, followed by an end-to-end anastomosis.

Chronic Intestinal Stasis, the Lane Kink, Cecum Mobile, and Allied Conditions. All articles dealing with this subject begin with the general statement that the symptoms of so-called chronic appendicitis are not always relieved by extirpation of that organ. The subject of chronic abdominal complaints, characterized by more or less ill-defined attacks of pain coupled with obstinate constipation and marked neurasthenia, has been approached from various sides by a number of different authors. The symptom-complex, presented by the patients of these different observers, bear a striking resemblance to each other.

Arbuthnot Lane¹ considers that "*intestinal stasis* results from a mechanical alteration in the normal arrangement of the intestine, leading to delay in passage of the contents, occurring in certain portions of the alimentary tract." These lead to absorption of toxic material, which he holds responsible for a large number of ailments. He presents rather novel explanations regarding the origin of duodenal ulcer, and the failure of gastro-enterostomies to cure certain gastric ulcers. Besides describing the occurrence of bands at the pylorus, along the outer aspect of the cecum and ascending colon at the hepatic and splenic flexures, and around the rectum and sigmoid, he speaks of a band which "develops on the under surface of the mesentery of the last few inches of the small intestine. . . . This contracts and deforms the ileum, producing a kink or obstruction of this portion of the intestines, especially in the erect posture of the trunk. In consequence of this kink, the small intestine becomes very much dilated, and this dilatation may extend as far up as the pylorus. The symptoms produced by this obstruction are superficially very much like those of (chronic) appendicitis."

Lane's treatment for chronic intestinal stasis consists in side-tracking the affected intestine or resecting it.

Franklin Martin² became interested in the *Lane kink of the ileum* while at the Mayos' clinic. Martin's description of this localized thickening of the mesentery reminds one very strongly of the description by Hofmeister (see below) of the bands which he observed tying down the ascending colon, hepatic flexure, and, at times, the cecum and appendix. Martin says:

"At first it may be difficult to demonstrate this portion of the gut because of adhesions, or because of the short mesentery. As an attempt is made to spread out the intestine, the definite kink will be revealed.

¹ Surgery, Gynecology, and Obstetrics, November, 1910, p. 495.

² Ibid., January, 1911, p. 4.

It is not only bent to the extent that its lumen is obstructed, but it is rolled or wrapped in its own mesentery, to one leaf of which it is firmly adherent, to from one-fourth to one-half of its circumference, and to that extent it is still further obstructed in its lumen. "As the kinked intestine is placed on a gauze sponge and slight tension made on it, the adhesions are revealed, and as they are carefully divided by scratching through them with the point of a knife, the bent and imprisoned intestine is relieved and its obstruction is immediately overcome. "As the adhesions are divided and the intestine resumes its former condition, thickened portions of the mesentery are revealed, showing an hypertrophy that develops in consequence of the strong pull on it. The leaf of the mesentery, representing the portion adherent to or wrapped about the gut, will exhibit triangular raw surfaces, showing the extent to which it had imprisoned the gut."

At the meeting of the Western Surgical and Gynecological Association, December, 1910, Dr. Charles Mayo, in speaking of the cases showing a Lane kink near the ileocecal valve, observed at the Rochester Clinic, expressed the belief that this is a real cause of obstruction. The symptoms often simulate those of chronic appendicitis, chronic colitis, and other non-acute abdominal conditions. He recommends, therefore, that, when possible, at laparotomy for obscure cases of digestive disturbance, the last few inches of the ileum should be examined.

In Germany, Wilms, Klose, and Fischler, and quite recently, Hofmeister¹ have discussed the condition at length. The latter, in his plausible article, quotes the cardinal symptoms of this condition as given by Stierlin, of Wilms' clinic, as follows:

1. There are attacks of colic, mainly located in the region of the cecum and ascending colon, unaccompanied by any rise in temperature, and often associated with continued painful sensations in this region; the pain may also involve the region of the stomach. It may last for a longer or shorter time.

2. Chronic obstinate constipation is present, alternating with short periods of diarrhea; these latter usually occur at the end of an attack of colic. A tumor, of a balloon-like character, is felt in the region of the cecum, which, upon palpation, gives forth gurgling sounds, and which may or may not be painful; it is often distinctly movable.

Authors differ as to which of the pathological conditions found is to be regarded as the essential underlying cause of this symptom-complex. Wilms believes in the mobility of the cecum; Klose, in "habitual torsion of the cecum mobile." The views of both these authors have been referred to in recent numbers of *PROGRESSIVE MEDICINE*. Moreover, Wilms believes that, according to the studies of Payr, chronic constipation and the hindrance to the passage of intestinal contents are due

¹ Beitr. z. klin. Chir., Band lxxi, Heft 3, 1911.

to obstruction at the splenic flexure. Fischler assumes chronic catarrh of the cecum which leads to muscular atony.

Hofmeister describes the condition he finds at laparotomy somewhat as follows: The beginning portion of the large intestine is found dilated with fluid feces and gas to the size of a fist. It may form a loop which sags to the left, or it may sag downward. The cecum and lower ileum share in this mobility. The extreme form of this is described by Wilms as the *cecum mobile*.

In certain very mobile ascending colons Hofmeister observed the cecum to be fixed, while, in some cases, the freely movable ascending colon was displaced downward, so that a loop of it lay in front of the caput coli. This condition was present in cases of so-called chronic appendicitis fully as often as a freely movable cecum. Veil-like adhesions, varying in density, were seen at different points, especially at the ascending colon, around the gut at the cecum, appendix, and lower ileum. These could be lifted up with a fine forceps, and only after division of their delicate membrane did the true serous covering of the gut become exposed. Their consistency varied from that of a fine veil-like substance to firm strands of scar tissue. The constricting action of such bands could not be fully appreciated until one saw how the intestinal wall unfolded to its normal shape after their division.

Not only have such adhesions been noted at the ileocecal region and along the ascending colon, but they occurred frequently around the hepatic and splenic flexures also, and in the region of the sigmoid. Attention was first called to them by Virchow many years ago. Hofmeister believes that the chronic "adhesive appendicitis" described by von Haberer represents merely one aspect of this condition. Microscopic examination of the enlarged mesenteric lymph nodes obtained at operation showed nothing more than chronic inflammatory hyperplasia.

A ptosed transverse colon has been seen lying parallel to the ascending colon and joined to it by these filmy adhesions from the hepatic flexure down to the ileocecal junction.

The Röntgen ray, as has been remarked elsewhere in this article, is of great value in diagnosing cecal dilatation and relative obstruction at the hepatic flexure. The normal cecum is found to be free from bismuth at the end of twenty-four hours, while in this disorder it may be seen lingering there for seventy-two hours. By turning the subject upon the left side, the mobility of the cecum may be determined.

Among the conditions from which this ailment must be differentiated, and which offer a specific and definite pathological basis, are: Gallstone disease, remnants of acute appendicular processes, diseased adnexa, etc. Their diagnosis is, as a rule, not difficult. To distinguish the neurasthenic or hysterical subject complaining of abdominal symptoms, who has no visible pathologic lesion, from the individual who has been made neurotic by the annoying discomfort of actual trouble, presents a

far more difficult task. Too many persons suffering an actually curable malady are labelled "hysterics" and told that nothing can be done for them, and, *vice versa*, too many neurasthenics have been persuaded to submit to useless operations.

In short, adhesions around the hepatic flexure, whether the result of catarrhal colitis, or whether following the inflammation of neighboring organs, such as the bile passages, stomach, or duodenum, are considered by Hofmeister to be the chief factor in causing a dilatation of the cecum and ascending colon. He reports that *trichocephalus dispar* was found in 10 of his last 14 cases. This may or may not be a coincidence. He points out that, according to recent investigations at the clinic of Eichhorst, this parasite has been considered capable to give rise to chronic colitis. No definite conclusions can be drawn from so limited a number of observations.

As regards the *treatment* of this condition, Fischler, who believes the underlying cause to be a catarrhal colitis, directs his efforts toward lessening the amount of food taken, avoidance of food which might lead to distention, and toward medication appropriate for catarrhal conditions of the large intestine. Finally, for the time of free intervals between attacks, he advocates plenty of exercise.

Wilms believes that, in certain cases, appendectomy is useful, because after its performance, the mesenterium having been removed, the movable cecum cannot exert a pull upon it. This author fixes the cecum in a retroperitoneal pocket after he has made his routine removal of the appendix. He reports relatively good results—75 per cent. healed, 16 per cent. improved, 9 per cent. unimproved. Hofmeister believes that in the cases in which Wilms' method is successful, the fixation of the cecum high up prevents traction upon the hepatic flexure, and consequently lessens angulation and obstruction at that point.

Klose treats habitual torsion of the cecum by suturing the entire ascending colon to the parietal peritoneum.

In his earlier cases, Hofmeister remedied the obstructive conditions by introducing a spatula behind all strands which constricted the colon, then dividing them with the Paquelin cautery. When the area covered by these was extensive, such treatment merely led to the development of new adhesions. Therefore, at present, he limits this treatment to cases in which there are only a few such bands. For cases in which there is an extensive involvement of the ascending colon and hepatic flexure, he performs "typhlotransversotomy." This consists in the establishment of anastomosis between the beginning of the ascending colon and a convenient point of the transverse colon. The opening, which should be large enough to admit two or three fingers, is made through the posterior tenia of the transverse colon and the middle tenia of the ascending colon. In making this anastomosis, the ptosed colon is usually found to be very vascular, and therefore a most

careful suture should be made to avoid hemorrhage from the cut edges. Appendectomy is performed as a matter of routine. Hofmeister first performed this operation on February 2, 1909; since then it has been repeated 21 times, mostly in 1910. It is therefore too early to pass judgment upon its merits. In brief, Hofmeister believes that the essential cause of the symptoms frequently labelled as chronic appendicitis, is a relative obstruction to the passage of intestinal contents due to adhesions in the region of the ascending colon.

Rectosigmoidal Arterial Anastomosis. C. B. Davis,¹ in an article dealing with rectosigmoidal arterial anastomosis, presents a careful study of its variations. The surgical importance of this anastomosis was brought out by Hartman, who showed that the safe point for ligation of the

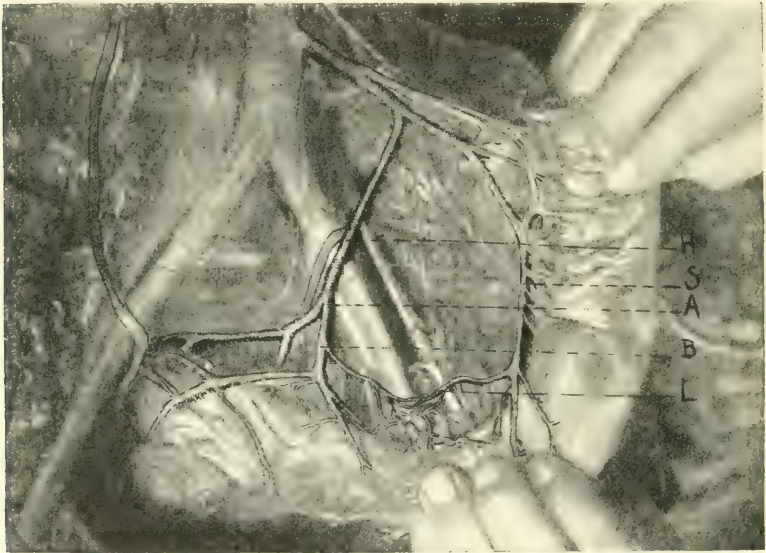


FIG. 47.—A, critical point: B, too low to supply entire rectal system; S, sigmoid; H, superior hemorrhoidal artery; L, loop anastomosing with the superior hemorrhoidal artery below bifurcation. (Davis.)

superior hemorrhoidal artery was proximal to its junction with the anastomotic loop of the sigmoidal artery. After ligation at this point, the blood from the sigmoidal artery passes through the anastomotic loop, and thus is distributed to the rectum below the level of the ligation. Ligation of the superior hemorrhoidal artery distal to the anastomotic loop results in gangrene. Sudeck was the first to emphasize that, to determine the exact location of this anastomosis, it was necessary to make an abdominal incision (Fig. 47). Davis examined 21 subjects,

¹ *Annals of Surgery*, October, 1910, p. 529.

with the view of determining the frequency and nature of the variations of this anastomosis. He found it subject to marked irregularity. In some cases, the anastomotic loop was close to the intestine; and in others, it was situated high up, close to the parent artery. Where the critical point lies close to the intestine, clamping of the vessels far back from the rectum would not interfere with circulation, but where a high bifurcation of the artery existed, nothing short of a laparotomy with identification and exposure of the critical point could insure proper circulation. Therefore, Davis concludes:

"1. Following high resection of the rectum, gangrene of the stump can be avoided by ligation of the superior hemorrhoidal artery proximal to the point of entrance of the anastomotic loop from the sigmoidal artery.

"2. Where high resection of the rectum is to be done by the sacral route, a preliminary abdominal incision is of value, to determine the presence and location of the critical point. The relations of the superior hemorrhoidal artery permit of a definite placing of ligatures to check hemorrhage.

"3. The anastomotic loop is not present in some cases. High resection of the rectum for carcinoma in these cases should be terminated with a permanent colostomy."

Inasmuch as in those cases in which gangrene of the stump occurs from occlusion of the vessels, there is danger of the infection reaching the peritoneal cavity, and even when this does not occur, the convalescence is long and tedious, and, further, since we have no other means of ascertaining the type of anastomosis each particular patient possesses, the suggestion to determine the location of the critical point by a laparotomy seems very reasonable.

Sudeck¹ recently again brings forward the fact that, in operation for carcinoma of the rectum, high ligation of the superior hemorrhoidal artery permits free mobilization downward of the large intestine, without endangering its viability. But he goes even farther by recommending the ligation of the inferior mesenteric artery also, which, as proved by two cases in which this had been done with success, does not lead to gangrene.

End-to-End Intestinal Anastomosis by the Invagination Method. C. L. Gibson² has presented this method. He believes it to be useful in difficult cases of reunion of the large intestine where other methods are impracticable. Like many other new procedures, this was developed under stress of necessity met with in unusual operative conditions. At the termination of a very difficult extirpation of a double pyosalpinx, it was seen "that for the length of about 6 inches, the upper part of the rectum

¹ Deutsche Zeitsch. f. Chir., Band cvi, p. 519.

² Annals of Surgery, July, 1910, p. 116.

had been completely denuded of its peritoneum. Ordinary resection being judged impracticable, the gut was divided at the lower end of the denudation. A long pedicle clamp was then passed through the anus and made to grasp the upper segment and pull it through the lower end down as far as it would go—nearly to the anus, where it was maintained by fixing the clamp in position. To ease the tension, two or three sutures were introduced at the point of contact of the two segments. At that time the idea that one could deliberately make a satisfactory suture which could be depended on alone did not occur to me. To my astonishment, the patient made an uninterrupted recovery. The clamp was removed in two days; feces were passed normally; there was never any leakage, as we could easily convince ourselves, the wound having been only partially closed as a precautionary measure.”

In a second case, presenting similar conditions, the procedure was repeated with success, and, encouraged by these experiences, Gibson employed this as his method of choice in two subsequent resections of the rectosigmoidal junction for carcinoma. In experiments upon dogs by H. K. Kellog, it was found that this type of anastomosis could be successfully employed upon the small intestine. Gibson says: “Its usefulness is perhaps more evident in the large intestine where end-to-end union is so apt to be imperfect, even in the hands of the most competent. I believe that if lateral anastomosis is impossible after resection of the colon, the method here described will be found the next best; it has also an undoubted superiority over lateral anastomosis in its simplicity, and requires much less time for its performance.”

The exact details of technique are as follows: “The upper cut edge of the gut is seized with two Kocher clamps passed up through the anus and introduced by these into the lumen of the lower end and maintained there by an assistant. The extent to which it is feasible to accomplish this invagination, will vary depending upon the laxity of the mesentery. If the latter is very short it may be somewhat elongated by a generous incision of its outer layer. As a rule, I should wish to carry the cut end of the upper segment as far down as possible, hoping more efficiently to direct the fecal current away from the suture line. The gut is rotated about a quarter-circle, so that the non-peritoneal surfaces do not entirely approximate in the circumferences. Eight to twelve interrupted silk sutures are introduced thus; a Lembert suture is begun on the lower segment, the needle issuing just short of the cut edge; on the upper segment the needle is introduced just above the line where the cut edge of the lower segment lies against the intact wall of the upper. When the knot is tied, the free cut edge has been turned inward and only the peritoneal surfaces are in contact. A continuous running suture is applied over this area, further invaginating the first ones, the Kocher clamps being previously withdrawn.”

Much the same result in establishing a union between the sigmoid

and rectum is obtained by Balfour's¹ method. A three-quarter inch rubber tube was passed through the anus and rectum a little beyond the site of operation. To the upper end of this tube, the lower end of the sigmoid is fastened by suture, allowing downward traction upon it, thereby facilitating anastomosis with the cut margin of the rectum. In addition to this, the presence of the tube so situated, shields the site of anastomosis from any infection caused by the leakage of fecal or gaseous material.

The essential steps of this operation are as follows: "Two pairs of forceps were clamped across the bowel at a suitable distance below, and two above the tumor. The necessary amount of sigmoid with the tumor was excised, the cut ends being sterilized. Removing the lower

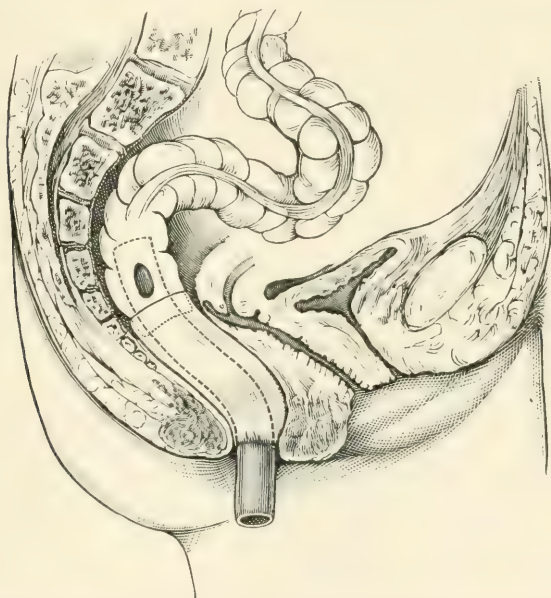


FIG. 48.—Profile drawing of median section of pelvis, showing completed anastomosis. (Balfour.)

clamps, a three-quarter inch rubber tube was now passed into the lower segment of the bowel until its distal end protruded through the anus. The upper end of the rubber tube was then inserted into the proximal end of the sigmoid to a distance of about three inches, being secured there by a transverse catgut stitch which was placed one-half inch above the cut end of the intestine (Fig. 48).

Traction having now been made by an assistant upon the end of the tube projecting from the anus, the cut ends of the bowel were approximated. Thus anastomosis, with careful coaptation of the mucous

¹ *Annals of Surgery*, February, 1910, p. 239.

membrane, was made possible by interrupted through-and-through catgut sutures. Further traction having been made upon the tube a certain amount of invagination was effected, when a second row of seromuscular sutures completed the procedure. Even if the parts were so deeply situated that the second row could not be well placed, the ultimate result was good. Defects in the peritoneum were closed by suturing and by omental graft. Drainage was provided by two wicks carried through the abdominal incision to each side of the anastomosis. The rubber tube remained in position for about six days. By that time the catgut sutures were absorbed. The abdominal drains were loosened on the fourth to the sixth day, but were not removed for a week.

Sigmoid Replaced by Small Intestine. Reichel¹ gives an account of how an accident, resulting in grave injury to the sigmoid flexure, necessitated an extensive resection, so that the lower end of the descending colon had to be brought out at the upper angle of the laparotomy wound. Contrary to expectation, recovery ensued. The young patient was extremely desirous of being relieved of the existing fecal fistula. Reichel was unwilling to implant the lower end of the ileum in the remainder of the rectum. This would have excluded the major part of the healthy large intestine. He determined, therefore, to establish communication between the descending colon and the rectum by means of a loop of small intestine. About 35 cm. of the lower ileum were isolated by section, and the continuity of the small intestine was reestablished by end-to-end anastomosis. The lower end of the isolated segment of the ileum was then implanted into the rectum, and its upper end was brought out in the upper angle of the laparotomy wound. At a subsequent operation, the lower end of the descending colon was united with the upper end of the implanted ileum. The patient made a smooth recovery, normal function of the large intestine appearing to be restored. Reichel suggests that following extensive resection of the sigmoid flexure for carcinoma, this procedure may be of use in avoiding the presence of an artificial anus.

Diverticula of the Lower Bowel. Wilson,² of the Mayos' clinic, reports 15 cases of this condition. In 4 of these carcinomata "apparently arising upon diverticula" were present. In view of the fact, proved by abundant demonstration, that a high percentage of gastric carcinomata originated in islets of epithelium placed in the midst of scar tissue in the bases of gastric ulcers, and in view of the fact that carcinomata arising in the tip of the appendix are apparently derived from epithelium which had become segregated in the course of obliteration of the lumen of that organ, Wilson ventures the suggestion: "Is a similar segregation

¹ Verhand. d. Deutsch. Gesell. f. Chir., April, 1910.

² Annals of Surgery, February, 1911, p. 223.

of epithelium present in diverticula of the lower bowel, and, if so, may it furnish the favorable condition for the development of carcinomata?"

Previous researches justify the conclusion that diverticula of the lower bowel are probably due to congenital weakness of the circumferential muscularis, and to the pressure of chronic constipation.

We quote directly from Wilson, as follows: "It is difficult to say whether or not all the diverticula are initially true herniæ, *i. e.*, contain all of the coats of the viscus, and later become false through their mode of development, as is the opinion of Hartwell and Cecil. Certainly, we have found many colons so defective in both circumferential and longitudinal fibers, that with any considerable pocketing of the walls many areas would have exhibited no muscular coat. In any case, it is certain that as diverticula develop, their coats may become thin to such an extent that the muscularis, if ever present, becomes imperceptible. This thinning of the walls, particularly of the distal portions, is often so great that one can readily understand how there may be escape of the bacterial contents of the colon into the subserosa without actual rupture of the mucosa and submucosa. In several diverticula, in our cases, this escape of bacterial irritants seems to have taken place without the epithelium within the hernia showing any inflammatory changes whatever. Just outside the submucosa and within the fat of the subserosa, a diffuse infiltration with leukocytes occurs accompanied, in some instances, with a marked increase of fibrous tissue. At the same time, the mucosa in the tip of the diverticulum appears to be perfectly normal. This is especially so if the lumen of the diverticulum opens freely into the bowel." This is the condition which Wilson previously described as peridiverticulitis. Speaking of it, he says: "It is one condition which, it seems to me, it is important to recognize, since any symptoms arising from such an inflammation will be initially present in the peritoneum and not in the colon or diverticulum itself. Of course, as an inflammatory tumor mass thus develops in the peritoneal fat, close to the bowel, symptoms of obstruction may arise. . . . Whenever a diverticulum becomes infected with feces, an inflammatory reaction of greater or less extent is set up within it; when, in addition to such impaction, there exists a greater or less occlusion of the lumen of the diverticulum, the inflammatory process is proportionately increased. Many diverticula have globular extremities with lumina which are either narrow or completely closed off from the lumen of the gut. The mucosa in diverticula of this type is always markedly thin, or entirely absent at the narrowed portions of the lumina, while within the tip it is either degenerated or disintegrating, or shows low grade proliferative changes. These two types of change in the more or less completely segregated epithelium of the tip of the diverticulum are parallel in all respects with the cell changes which occur in masses of epithelium segregated about the base of the gastric ulcer. In other

words, it appears that if the segregated epithelium has its blood supply materially reduced, it degenerates and disintegrates. If, on the other hand, its blood supply is not materially interfered with, it proliferates. This proliferation usually takes the form only of an increase in the number and size of the cells without any invasion of the basic connective tissue. It seems but a very short step, indeed, from such an epithelial proliferation crowding the entire diverticulum, to the infiltration of its walls, thus forming a histological picture which must be diagnosed as carcinoma."

In short, Wilson has observed inflammation of the peridiverticular fat, in which the mucosa took no part and which was apparently due to leakage through the thin-walled diverticula. The symptoms of peridiverticulitis were either those of peritonitis or of obstruction from pressure. He believes that, in the 4 cases of carcinoma developing in diverticula, the malady started in epithelium which had become isolated in the course of chronic inflammation.

Co-existent Carcinoma and Tuberculosis of the Large Intestine. De Witt Stetten¹ published two most interesting observations of co-existent tuberculous ulcer and carcinoma of the large intestine. In the first case, an adenocarcinoma of the rectum had apparently developed upon the site of a tuberculous anal fistula which had existed for many years. In the second case, a carcinoma developed at the site of an ileocecal tuberculosis. Stetten assumes the primary condition to have been tuberculosis.

Pneumatic Rupture of the Intestine. This new type of industrial accident is described in a most interesting article by Wyllys Andrews.² He has collected 16 cases of this condition. Briefly stated, it consists in a forcing of the sphincter ani by a column of escaping compressed air and immediate rupture of the distended gut into the peritoneal cavity. In some cases, the air-filled peritoneum was enormously ballooned. A remarkable fact is that the air nozzle in several instances was an inch or more away from the body, and consequently the column of air had to traverse this distance and had to pass through one or two layers of cloth before reaching the anal orifice. We can do no better than to quote freely from Andrews' article. "Compressed air is used very generally to transmit power for drills, riveters, and small tools; for cleaning cars, engines, barrels, etc.; so that many large manufacturing concerns have it piped about their buildings and grounds. The air is supplied at from 40 to 125 pounds pressure, and flexible hose connections are attached to the pipe lines at various stations. So many of the above reports speak of 'initiating' or 'hazing' the workmen by their fellows with the air nozzle that this form of the practical joking mania must be

¹ Festschrift of the German Hospital, New York, 1909.

² Surgery, Gynecology, and Obstetrics, January, 1911, p. 63.

common. It may be that many minor or trivial accidents have happened which are not reported. . . ."

In regard to the forcing of the sphincter by the column of air when the nozzle is at some distance from the skin, Andrews writes: "I feel sure that at 50 to 125 pounds pressure the gas would form a column several inches in advance of the tube, which would act almost like a solid body in forcing open the sphincter. One has only to hold the hand near such a nozzle to realize the tremendous impact of the blast. . . . The pelvic floor and nates form, in fact, a funnel whose apex is the anus. The confined air expanding in this funnel will force the gut open without having the end of the pipe accurately adjusted to the anus. In describing conditions found at operation and autopsy, he says: "The rectum and anus escape much injury because of their outside support; the sigmoid tears, probably because it is the first to receive and confine the blast of inrushing air. The wide loop of the sigmoid flexure probably traps the air momentarily by its somewhat bent or kinked junction to the descending colon. It is this that sustains the first shock of the diastatic pressure, and, unable to pass the mass of air onward, it yields to the pressure, dilates, and bursts into the free peritoneal cavity. In all cases except one, rupture is reported as occurring at the longitudinal band." The *treatment* of this condition is directed to the immediate relief of the great pressure within the abdomen by allowing escape of the confined air by tapping with a hollow needle, or even with a small bistoury. This should be done as soon as the patient is reached by the ambulance surgeon, or those giving first aid. At subsequent laparotomy, which should be performed as soon as possible, extended search for the location of the ruptured loop is unnecessary, because this has involved the sigmoid or rectum in all cases observed, with but one exception, in which it was situated at the splenic flexure.

Idiopathic Dilatation of the Rectum. Bard¹ recounts a case showing this rather unusual type of Hirschsprung's disease. It will be remembered that the idiopathic dilatation of the large intestine indicated by this term usually affects some part of the sigmoid or colon, or both, the rectum in such instances, as a rule, being normal in size. In Bard's case, however, the rectum was the only part of the intestine involved (Fig. 49). Considering the anatomical condition found at death, the previous history of the case is of interest. The man was a farmer, aged forty-eight years, a large eater, who had never known any trouble referable to his abdomen. He had a movement of the bowels about once every two days. When he came under medical observation, a few days before his death, coughing, dyspnea, and a tendency to ascites were the only symptoms. After administration of a dose of castor oil, the patient developed choleric symptoms and died.

¹ *Semaine Médicale*, November 30, 1910, vol. xxx, No. 48, p. 565.

Autopsy revealed a rectum so dilated that it filled two-thirds of the abdomen, pushing up the diaphragm to the third interspace on the right. This hugely dilated rectum had a diameter of 35 cm. at its widest point, narrowed somewhat as it reached the diaphragm, turned downward to the left at this level, and formed a progressively narrowing descending loop adherent to the huge ascending portion; this was 10 cm. in diameter at the top and 5 cm. at the lower end where it turned behind the main mass. Examination of the rest of the intestinal canal revealed nothing abnormal in the stomach or small intestine. The

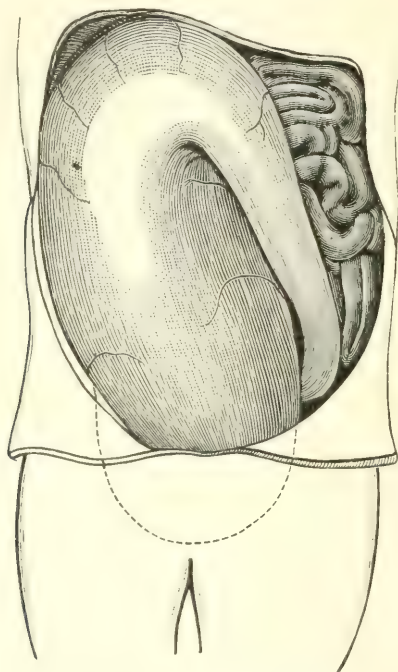


FIG. 49.—Megarectum. (Bard.)

normal appendix and caput coli lay in the right iliac fossa. The ascending colon passed directly to the splenic flexure, there being no hepatic flexure or transverse colon. From the splenic flexure, the descending colon ran downward retroperitoneally along the left side to the level of the anterior superior spine, where it emptied into the beginning of the cephalic end of the dilated rectum we have just described. Upon splitting open the gut, it was found filled with about five pounds of fecal material, the upper portions of which were semifluid. Its lower strata became progressively denser as the pelvis was approached; while in the true pelvis, filled entirely by this mass, it was composed of very hard inspissated fecal matter.

THE APPENDIX

Recent Views about Appendicitis. MacCarthy and McGrath,¹ pathologists at the Mayos' clinic, have recently published a rather suggestive article dealing with appendicitis and associated disturbances. They believe that there is certain clinical evidence that "individuals who present a higher percentage of obliterated or partially obliterated appendices at operation, have had symptoms referable to the epigastrium, and that this percentage is lower when no recognizable pathological condition of the appendix is found." Their figures, which are the result of the examination of the histories and specimens of 2000 cases in which the appendix was removed for appendicitis primarily, or, secondarily to other abdominal conditions, they deem "sufficiently important not to prove, but to stimulate, a careful study of clinical histories with relation to the possibility that chronic inflammation in the appendix reflexly disturbs the gastroduodenohepaticopancreatic physiological system, thereby bringing about conditions whereby such lesions as gastric ulcer, gastric carcinoma, duodenal ulcer, cirrhosis, cholecystitis, cholelithiasis, and pancreatitis may be indirectly produced." They find, in their study of this large material, that "the average duration from the onset of symptoms to operation, in appendicitis, cholecystitis, and cholelithiasis, revealed respectively two, four and nine-tenths, and six and one-half years. It will be seen that the average duration in cases of cholecystitis lies between the average in appendicitis and cholelithiasis. . . . Are we dealing with a process which manifests itself in three stages, namely, appendicitis, simple cholecystitis, and cholecystitis with stones?"

"The average age at the onset of symptoms in these three conditions, is also of interest. . . . In appendicitis, it is twenty-three and one-half years; in cholecystitis, thirty-four and seven-tenths years; and in cholelithiasis, thirty-three and eight-tenths years. There is one thing to be considered about this, namely, that the symptoms in cholelithiasis are likely to be more sudden and severe, and therefore demand earlier attention than in simple cholecystitis." As they themselves say, they do not look upon their findings as conclusive. These are none the less interesting, and we fully agree with their recommendation that "a careful study of the subsequent histories of all cases operated upon for appendicitis should be made in order to determine what percentage of them have developed gastric ulcer, gastric carcinoma, cholecystitis, cholelithiasis, cirrhosis, and pancreatitis."

The Treatment of Suppurative Pylephlebitis after Appendicitis. Wilms² reported the case of a patient with a severe appendicitis which was fol-

¹ *Annals of Surgery*, December, 1910, p. 801.

² *Centralblatt für Chirurgie*, 1909, No. 30.

lowed by infection of the venous radicals of the portal system. Ligature of these radicals apparently brought about a cessation of the chills and high temperatures, with prompt recovery. On account of the rarity and importance of this condition, the circumstances surrounding the operation by Wilms are of sufficient interest to bear brief repetition. A man, aged forty-two years, was admitted to the hospital upon the tenth day after onset with a large appendiceal abscess. This was incised and drained. The temperature promptly fell and remained down for one day. Toward the end of the second day a severe chill with high temperature occurred; three chills took place on the third day, and one upon the fourth. Two hours after the last chill a second operation was performed. Upon exposing the ileocecal region, the finger was introduced behind the ascending colon, freeing the beginning of the large intestine and the end of the ileum from the posterior parietes. After dividing the anterior peritoneal leaf of the mesentery in an oblique line between the ascending colon and the lower ileum, the vessels could readily be recognized. Two small arteries, which were particularly prominent, were isolated, to guard against their being included in the subsequent ligature. Two mass ligatures sufficed to tie off all the veins in this locality. The region of the cecum was drained to provide an outlet should gangrene set in. No subsequent chills occurred. The patient made a smooth and uneventful recovery.

Sprenkel,¹ in reporting a similar case which ended fatally, refers to Wilms' communication just quoted. A brief summary of his case follows: A man, aged twenty-nine years, was operated upon thirty-six hours after the onset of his first attack of appendicitis. The acutely inflamed, gangrenous appendix was perforated at the tip. It contained a large coprolith. At first, the postoperative course was fairly smooth, but eight days after operation the first chill set in. Then chills occurred twice or thrice daily for several days. At the time physical examination revealed a soft, painless belly, pulse of about 90, liver not enlarged, not tender. There was no icterus; lungs were clear. Operation was suggested two days after the chills had commenced, but consent was not obtained until two days later; then, upon the twelfth day after operation and upon the fourth day of the chills, the abdomen was opened again. The ascending colon and cecum were found firmly attached to the posterior parietes, therefore mobilization of the cecum and its retroperitoneally situated vessels was accomplished with difficulty. On account of much subperitoneal fat, a proper exposure of the vessels could not be obtained. The vessels belonging to the lower end of the small intestine and those leading to the caput coli were tied off. The wound was partly closed—as far as was possible—with the extensive local drainage which was made. The chills were repeated two or three

¹ *Centralblatt für Chirurgie*, 1911, No. 2, p. 33.

times, and then ceased. There was no peritonitis. The belly remained soft and painless. A fecal fistula developed, however, and an irregular fever set in, accompanied by slight jaundice. Small repeated hemorrhages occurred from the sloughing wound, which did not show the slightest tendency to heal. In short, the patient presented the picture of general sepsis, from which he died three weeks after the second operation. Autopsy revealed, besides a localized focus of infection in the right iliac fossa and the presence of a fistulous opening in the lower ileum, a thrombophlebitis of the superior and inferior mesenteric veins—that is, pylephlebitis with extension even to the finest branches of the portal vein. In the liver were multiple abscesses of varying size; the spleen was enlarged; there was myocarditis. Examination of the site of ligature conveyed the impression that the object in view had been accomplished at both ends of the row of ligatures, but that there had been failure to include all the vessels lying at the middle.

Pylephlebitis, occurring as a sequel of appendicitis, has attracted attention for the past twenty years or more. Fortunately, its occurrence in the vast number of acute inflammations of the appendix which come to operation nowadays is rare. The mortality is very high. Symptoms pointing to its presence usually begin some time after operation, generally during the second or third week. The end may come within a short time, or it may be several months before the individual finally succumbs. The outlook for cure of this condition by operation is, naturally, not brilliant; for, by the time that the first chill and high temperature, in the absence of other symptoms, indicate the presence of this condition, the entire portal system may be hopelessly involved. Nevertheless, in so hopeless a condition, it seems fair to afford a patient the chance that operation offers, for even if only a majority of the infecting thrombi can be disposed of, it is conceivable that the system may be sufficiently relieved thereby to successfully cope with the remainder.

Wilms suggests that the ideal treatment of this condition is that of any localized mesenteric thrombosis, namely, resection, which here should include the cecum and lower end of the small intestine. This, unfortunately, cannot be performed in cases with abscess.

Pseudomyxoma Peritonei Due to the Appendix. Trotter's article dealing with this condition was referred to in *PROGRESSIVE MEDICINE* for December, 1910. His patient was operated upon and recovered. Here the condition originated from the appendix.

Honecker¹ states that this condition has been well recognized by gynecologists since Werth's publication in 1884, in which it was described, following the rupture of an ovarian cyst with consequent flooding of the peritoneal cavity by masses of mucus-like material. The condition is much rarer as a sequel of appendicitis. Honecker reports 2 cases.

¹ Frankf. Zeitsch. f. Path., Band iv, Heft 2.

In one, the condition was far gone and death followed shortly after operation. The second came to operation in an early stage of the malady, and recovered after the appendix had been removed.

Honecker describes its pathology as follows: The proximal part of the appendix undergoes obliteration, and the distal portion forms a mucous cyst. If this ruptures, mucus is poured into the abdominal cavity and injures the peritoneum. As a consequence of continued mucus secretion, the entire peritoneal cavity is eventually filled. Such a condition was found in the first case just referred to. A man, aged seventy-nine years, had recovered from an attack of appendicitis ten years previously, and only in the six months prior to operation had he experienced indefinite symptoms referable to the abdomen. Simple appendectomy with evacuation of the masses of mucus will cure this condition, provided that living cells from the mucosa of the open appendix lumen have not become detached and have not been carried to other portions of the peritoneal cavity to develop new growths there.

Merkel,¹ in presenting a case of his own, takes occasion to review the literature dealing with pseudomyxoma peritonei after rupture of the appendix. In addition to the information supplied by Hornecker, he brings out the following interesting facts: About 60 cases of pseudomyxoma peritonei have so far appeared in the literature; although most of these have been in women, more recent observations showed that the condition also occurred in men. Fränkel, in 1901, was the first to call attention to the appendix as a possible source of the masses of mucus. His findings were confirmed by Merkel in 1903, and since then the cases of Hueter, Neumann, and Honecker have appeared.

Previous to these carefully studied cases, a number of observations appeared in the literature reporting similar changes in the peritoneal cavity, where, however, nothing was said regarding the condition of the appendix. These occurred in men, and from the state of our present knowledge it is very likely that they also were caused by a ruptured cystic appendix. They were reported in 1866, by Ritter, Henke, and others. Aside from these is an extremely interesting report by Gertrude Roegner (1905), in which the pseudomyxomatous condition of the peritoneum came from an isolated diverticulum of the small intestine (an enterocystoma). The appendix and ovary showed no abnormalities. Merkel's own case occurred in a man, aged seventy-nine years, who died of pneumonia. At autopsy the appendix was found obliterated at the proximal end for a distance of 1 cm., with cystic dilatation of the distal part as large as a pigeon's egg. An opening the size of a pea permitted the escape of mucus.

Goldschwend² reports observing a huge hydrops of the appendix,

¹ *Verhandl. d. Deutsch. Patholog. Gesellschaft*, 1910, p. 161.

² *Wiener klin. Woch.*, 1909, No. 49.

having to a certain extent the form of the stomach. Its greater curvature was 39 cm. long, and it had a circumference of 25 cm. It is not hard to appreciate that its rupture could readily lead to a condition such as described above.

Sarcoma of the Appendix. E. O. Jones¹ reports a case of this extremely rare condition. Search of the literature has revealed but 8 other authentic cases. So far, round-celled sarcomata have predominated, the occurrence of the spindle-celled type being the next most frequent. Naturally, an accurate diagnosis before operation is impossible. However, all cases showed symptoms pointing to some type of appendicitis.

Total Congenital Absence of the Vermiform Appendix. A case of this condition has been reported by U. G. Dailey.² The finding was made at autopsy on the body of a negro man, aged forty years, who met death by accident. "Three longitudinal bands met in the inner and posterior aspects of the cecum, about 3 cm. below the ileocecal angle. The cecum itself was normal. A most careful search was made, after apparent absence of the appendix had been noted. The serosa was entirely stripped from the cecum and ascending colon in the process of this search. The interior of the cecum was also explored with great care, but not the slightest trace of an appendix or its orifice could be found. The peritoneum was perfectly normal . . . nor was there any semblance of evidence pointing to previous surgical intervention."

Dailey gives an excellent résumé of the literature dealing with this subject.

THE LIVER AND PORTAL VEIN

McArthur's Enteroclysis by Catheterization of the Common Duct. Matas, of New Orleans, at the meeting of the Southern Surgical and Gynecological Association, December, 1910, reported very favorably upon the usefulness of this procedure. The method recommended by McArthur³ was to connect a saline drip to a drainage tube in the gall-bladder, allowing the water to find its way into the duodenum *via* the cystic and common duct. The procedure is indicated in toxic biliary cases. Matas modified McArthur's method, inasmuch as he preferred to inject the fluid directly into the duodenum by introducing a ureteral catheter into the duodenum by way of the open gall-bladder, cystic and common ducts.

The Surgical Treatment of Typhoid Bacillus Carriers. Fromme⁴ publishes the cases of 4 women between thirty-eight and forty-six years

¹ Surgery, Gynecology, and Obstetrics, February, 1911.

² *Ibid.*, October, 1910, p. 14.

³ Journal of the American Medical Association, 1910, vol. liv, p. 1.

⁴ Deutsch. Zeitsch. f. Chir., vol. cvii.

of age, in whom not only the gall-bladder but also the biliary passages were found to harbor typhoid bacilli. After cholecystectomy had been performed, the bacteria could no longer be found in the excreta. According to a present theory, the gall-bladder forms a stagnant reservoir where typhoid bacilli may exist indefinitely. The partial and periodical emptying of the gall-bladder results in expulsion of typhoid infected bile into the common duct and so into the duodenum. The essential focus of infection is here eliminated by extirpating the gall-bladder, whereupon the biliary passages are cleared of infection by the continuous stream of bile.

Gallstones and the X-rays. As a rule, the presence of gallstones cannot be demonstrated by the x-rays. Only those calculi which are coated with or contain calcareous material offer sufficient resistance to the Röntgen rays to render them visible on the photographic plate. This is not very common. In a recent discussion before the New York Academy of Medicine, Pfahler, of Philadelphia, pointed out a means of differentiating stones in the gall-bladder from those lying in the kidney. The shadow of stones lying near the anterior abdominal wall (in the gall-bladder) appear smaller upon a plate placed in contact with the front of the body, than upon a plate in contact with the back. Just the reverse obtains as to the shadows of renal calculi.

Serodiagnosis of Echinococcus Disease. Judging from the French literature of the past few years, echinococcus disease, particularly of the liver and lungs, must be far more frequent in that country than in ours. The complement fixation test in determining the presence of echinococcus is practically a routine procedure, and is considered reliable.

The Ipecac Treatment of Amebic Liver Abscess and of Allied Disorders. F. W. Dudley¹ states that he has been using ipecacuanha in the treatment of amebic dysentery, bacillary dysentery, and diarrhea since 1899. Since 1907, when his attention was called to Leonard Rogers' article on the influence of this drug in the prevention of threatened liver abscess, the treatment has been thoroughly tried in a large number of cases with surprisingly good results. Some of the amebic dysenteries were complicated by hepatitis, and some cases of hepatitis had a previous history of amebic dysentery. Still other cases had no history of dysentery, and no amebæ were found in them. Dudley gives the essential points of a few characteristic cases. He reports having treated, in the Philippines, in all several hundred cases of amebic dysentery, both by colonic irrigation and by the ipecac method. He has found the latter treatment in its effects more prompt and certain. He says: "I do not know of a single case of liver abscess complicating amebic dysentery where the ipecac treatment was instituted early in the disease and properly carried out." In all of the cases of liver abscess which had come to him for operation, either there had been no previous treatment, or else

¹ Surgery, Gynecology, and Obstetrics, August, 1910, p. 187.

they had been treated by other means than ipecac or colon irrigation. In his irrigations, Dudley most commonly used quinine, alphozone, and tannic acid. He further says: "The ipecac treatment of amebic dysentery has been employed . . . with pronounced success. . . . It is prompt and efficient; if instituted at an early stage, the patient does not have to be confined to home or hospital for more than five or six days, and the treatment seldom has to be repeated unless there has been a re-infection.

"The method of administration of ipecacuanha, with some important modifications, is that described by Manson.¹ A preliminary dose of castor oil and laudanum is given, and the patient put on a milk diet. After fasting for four hours from both food and water, 2 grams of ipecac are given in 6 pills with just as little water as possible. The patient must lie on his back in bed in a dark room, and should not be allowed to talk or be in any way molested. He should take no food or liquid for eight hours after taking the medicine. After the eight hours are up, the patient may take milk and water liberally until four hours before the time for the next dose. I usually have the patient fast from 4 P.M. and give the pills at eight o'clock. In this way, he may take his food during a good part of the day. If the pills are so made that they will pass out of the stomach without dissolving, the preliminary dose of tincture of opium and the mustard plaster to the stomach may be dispensed with without fear of nausea. If at any time nausea should occur, an ice-bag about the throat gives most relief.

"1.65 grams are given on the second day; 1.325 on the third; 1 on the fourth; 0.65 on the fifth, and 0.325 on the sixth day. The patient is now put on light diet and a 0.325 gram pill is given for six days longer, when cure is usually complete, although in some cases it may be necessary to continue for twelve days.

"In this method of administration, the making of the pills is a very important matter. The pill mass is best made with the extract of glycyrrhiza. The pills are then coated heavily with salol or inclosed in kreatinized capsules. They may be coated with salol in quantities by rocking in a warm mortar with a little melted salol, or, if only a few are needed, they may be fixed on a needle and dipped in the melted salol.

"If kreatinized capsules be not at hand, the pill mass may be put in the ordinary gelatin capsules and the space between cover and body of the capsule sealed with a little liquid gelatin. The capsules are then placed in a Petri dish and a few drops of formalin are put in the dish so as not to touch the capsules. The cover is then placed on and allowed to remain for about eight hours. The capsules should be exposed to the air for six or eight hours before use, as otherwise they will prove irritating to the stomach.

¹ Tropical Diseases, 1907 edition, p. 452.

"This method of treatment has proved of value in the catarrhal, bacillary, amebic, and balantidium forms of dysentery, and in diarrhea so frequently met with in this country.

"We should not lose sight of the fact that dysentery and diarrhea were treated with considerable degree of success by means of ipecac and simaruba in the hands of the Spanish and native physicians for many years before the American occupation.

"The powdered bark and especially a decoction made from the bark of simaruba, in large doses, as given by the Spanish and native physicians, is one of the most valuable remedies we have today for subacute and chronic dysentery."

The *ipecac treatment for intestinal amebiasis* has also found favor in the Panama Canal zone. Brem and Zeiler¹ have used this with success in 14 cases of amebic infection. They state that the thickness of the salol coat of the ipecac pills must be carefully regulated so as to prevent either vomiting or the passage of the pills intact through the intestinal canal. According to their experience, the best administration consists in beginning with 60 to 80 grains at bedtime, decreasing the dose 5 grains daily until a dose of 10 grains is reached.

The *ipecacuanha treatment of acute hepatitis* preceding the formation of liver abscess is described in a recent article by Pilgrim,² the details of which we shall not go into here. The period of treatment lasts about two weeks; then the patients are allowed to get up and after a few days, practically cured, are sent away for a change of air.

Lateral Suture of the Portal Vein. Ligature of the portal vein rapidly results in death, because of the enormous stasis in the portal system and the injury to liver function. An exception to this occurs in which the vein has previously been subjected to continuous compression by echinococcus, as reported by Brewer in the *Annals of Surgery*, 1908.

It is of the utmost importance, therefore, that when the vein has been injured, either in the course of an operation or otherwise, its continuity should be carefully preserved. According to Hallopeau,³ the lateral ligature is applicable only in wounds not larger than 4 or 5 mm. and then the overlying peritoneum must first be removed. Even so, the danger of the ligature's slipping is great. Pressure by tampon alone is always unsafe. The use of a lateral clamp is accompanied by the dangers of secondary hemorrhage, and of infection and portal thrombosis. Hallopeau therefore recommends single continuous lateral suture as the operation of choice for the repair of such a wound. He employed it successfully in the case of a woman, aged thirty-five years, who had attempted suicide by shooting herself in the abdomen with a revolver.

¹ American Journal of the Medical Sciences, November, 1910.

² Indian Med. Gazette, Calcutta, cit. Journal of the American Medical Association, vol. iv, p. 1506.

³ Rev. d. Chir., 30 ann., No. 7.

The path of the bullet was found to go through the anterior part of the liver, and the portal vein showed a wound upon its anterior and right aspect 6 to 7 mm. long, situated 1 cm. from the liver hilus. The bleeding was controlled immediately by traction on the pylorus. A guide suture of No. 0 catgut on a curved Reverdin needle was passed through the lower angle of the wound. Traction upon this closed the lower part of the wound. Then a continuous suture was made with thread carried by a Delbet vascular needle, which included not only the wall of the vein, but also the overlying peritoneum. Bleeding ceased, the abdominal cavity was cleansed of blood, and a packing was led down to the suture line. The patient made a rapid, uninterrupted recovery.

Baron¹ states that the existing methods for obtaining *temporary anemia of the liver during operative procedure* upon this organ have certain disadvantages. The digital compression of the structures in the free margin of the gastrohepatic omentum is not only very tiring to the assistant, but also hinders the operator in his work. Ligation of vessels in the liver as they are met with, takes much time and possesses other obvious disadvantages. Baron has devised a clamp with soft blades, with which the hepatoduodenal ligament is compressed. The posterior blade is inserted through the foramen of Winslow. In case this is found closed, a small opening is made in the lesser omentum, permitting application.

Portal Thrombosis in a Child. Bode² reports the case of a girl, aged seven years, admitted to Garré's clinic, suffering from severe hematemesis and with marked ascites. Diagnosis was tentatively made of portal obstruction, with varices of the esophagus or stomach. Laparotomy relieved the ascites, and gastro-enterostomy was added. No exact diagnosis was possible even then. The patient died five days later. At autopsy, the true cause of the trouble was revealed in thrombosis of the portal vein at the hilus of the liver, and of the veins belonging to one of the more distant loops of the small intestine, which, besides having marked venous hyperemia, was the seat of beginning necrosis of the mucosa. There were also marked varices of the esophagus, and an ulcer of the cardia, with erosion of the veins.

Venous Anastomosis by Suture for Portal Obstruction. Villard and Tavernier³ report the case of a woman suffering from ascites due to cirrhosis of the liver, in whom they performed an end-to-end suture anastomosis of the right ovarian vein with a mesenteric vein in the region of the cecum. The patient died six days after the operation. Examination of the anastomosis showed a small clot blocking the lumen of the vein, which was also found kinked. This procedure is correct

¹ Centralb. f. Chir., 1910, No. 49, p. 1547.

² Bruns' Beitr. z. klin. Chir., Band lxiv, Heft 2, p. 505.

³ Lyons Med., 1910, p. 1113.

in principle. Its failure was due to technical difficulties which can probably be overcome by experience.

The Treatment of Suppurative Pylephlebitis after Appendicitis is discussed in the section dealing with the appendix, on page 135 of this article.

Chronic Portal Thrombosis is mentioned by Warthin, Banti, and others in their articles on Banti's disease and allied conditions (see Spleen).

THE PANCREAS

Cambridge Reaction. A report on the diagnostic value of the Cambridge reaction appeared in *PROGRESSIVE MEDICINE* for December, 1910. The consensus of opinion at that time seemed adverse. Wilson, in *Surgery, Gynecology, and Obstetrics*, August, 1910, relates the result of a series of 504 examinations. His conclusions are interesting. "It will thus be seen that of the 26 patients who were shown to have pancreatitis, only 9 (35 per cent.) gave a positive reaction, and even of these, 7, in one or more of the series of three tests, gave negative results. Of the 74 sick persons without pancreatitis, 35 (47 per cent.) gave one or more positive reactions. Of the 207 sick persons who, in all probability, had no pancreatitis, 73 (35 per cent.) were positive. Of the 17 well persons, 5 (30 per cent.) were positive." He concludes that from the foregoing it is apparent:

"1. That even when the most elaborate care is exercised to follow the technique of Mr. Cambridge's "C" reaction, in the most uniform manner, *if knowledge of the clinical histories and other factors of the personal equation be eliminated*, the end results, judged by Mr. Cambridge's own criteria, must be considered, as a means of diagnosing disease of the pancreas, as both valueless and misleading.

"2. There is no apparent clinical relationship between disease of the pancreas and any of our various types of end reaction.

"3. It does not seem to us that the end reactions are artefacts, but rather that they indicate actual metabolic variations. The relationship of these changes in metabolism, to the welfare of the patient, is not apparent."

Whipple, Chaffee, and Fisher, in the *Johns Hopkins Bulletin* of November, 1910, report the result of their studies regarding the Cambridge test in experimental pancreatitis and other conditions. Dogs were used in these investigations. Their conclusions are very interesting and are similar to those reached by Wilson, for they find that:

"1. The Cambridge test is of little value in establishing the diagnosis of acute pancreatitis in dogs. If the test is negative, it is pretty strong evidence against an acute pancreatitis.

"2. The Cambridge test is of even less value in the condition of chronic pancreatitis in dogs, and may be consistently absent even in extreme grades of this disease.

"3. A positive Cammidge test is not infrequent in normal dogs and men.

"4. The Cammidge test is almost constantly present in chloroform poisoning in dogs—a condition in which there is extensive liver necrosis and cell autolysis.

"5. The Cammidge test may be present in cases of pneumonia, or in any condition where there is active cell destruction and autolysis.

"6. The Cammidge test may be produced experimentally almost at will by intraperitoneal injections of hydrolytic cleavage products. These split products may be prepared by boiling pneumonic lung tissue (dog or man), or thymus, for hours with dilute acid, neutralizing, filtering, and concentrating to a clear fluid."

THE SPLEEN

Splenectomy for Malarial Spleen. In discussing the indications for the removal of the enlarged malarial spleen, Sante Solieri¹ states his conviction that it is a mistake to consider splenectomy advantageous for this condition under all circumstances. By its indiscriminate performance, an operation which, with proper indications, gives good results, is brought into undeserved disrepute. According to Solieri, splenectomy should be recommended only to individuals who complain of marked symptoms, whose spleens are enlarged, and in whom it is possible to palpate the upper pole of the spleen close to the free border of the ribs. In other words, it is permissible when grave symptoms are caused by undue tension upon the splenic pedicle, suspensory ligament, or stomach, when acute or chronic torsion, or abnormal fixation of the spleen interferes with the function of adjacent organs, or with the return circulation of the spleen itself, thus increasing the chances of splenic rupture. Under these circumstances only, does he consider splenectomy justified. It is merely a prophylactic measure against hemorrhage due to rupture.

Wandering Spleen. MacLaren² relates the case of a woman whose appendix had been removed on account of chronic abdominal symptoms of a vague character. There was periodical bleeding from the rectum. A fairly large tumor was felt near the uterus, which, upon opening the abdominal cavity, proved to be a spleen hanging by a pedicle about ten inches long. There was slight torsion of the pedicle, which, however, was not sufficient to cause circulatory disturbances. Following extirpation, the patient made an uneventful, smooth recovery.

Rupture of the Splenic Pedicle. Pohl³ reports an interesting case of rupture of the pedicle of the spleen in a boy who had been run over

¹ Langenbeck's Archiv, vol. xcii, p. 494.

² Annals of Surgery, June, 1910.

³ Deutsche Zeitsch. f. Chir., Band civ, p. 196.

by a wagon. Operation was performed within a short time after the accident, and revealed the attenuated pedicle of the spleen, which contained the uninjured artery, the vein having torn through. Pohl believed that the wheel which ran over the abdomen from right to left pushed the viscera to the left, tilting the spleen; then followed a torsion of the spleen around the vertical axis from the right backward toward the left causing its pedicle to tear. The more resistant artery withstood the trauma, whereas the vein parted.

Recent Views Regarding Banti's Disease and Similar Conditions. Warthin,¹ in his article on thrombophlebitis of the portal and splenic veins, says:

"From the cases reported in the literature (Banti, Dock and Warthin, Losen, Sanford, Dolley et al.) it is clear that in man the complex of splenic anemia and Banti's disease, as formulated by Osler, is, in certain cases, if not in all, the result of an obstruction to the splenic and portal circulation, particularly the former, and that this obstruction is most commonly the result of an old thrombophlebitis of the portal and its radicles. Nevertheless, the symptom-complex can be produced by compression of the portal and splenic vein from without, torsion of the splenic vein, dislocation of the spleen, etc. We must, therefore, group such portal or splenic obstructions with splenic anemia or Banti's disease, and we cannot regard these conditions as individual disease entities, but only as symptom-complexes and pathological complexes due to various causes. Cases of so-called splenic anemia with neoplastic changes in the spleen, fall into another group and are not considered here.

"The essentials of the complex of portal and splenic obstruction are large splenic tumor, small liver, hematemesis, sudden hemorrhages from mouth and anus, ascites relieved by hemorrhage, splenic tumor, often diminished after hemorrhage, intermittent character of symptoms due to progressive thrombosis with canalization, rarely icterus, very acute or chronic secondary anemia, and usually leukopenia. The writer would class all the old cases of portal and splenic thrombosis, splenic tumor and hematemesis with the modern cases of splenic anemia and Banti's disease, and *vice versa* all the cases of the latter with those of the former. They all represent the same thing.

"In regard to the main symptom of the complex, the secondary anemia is the result of hemorrhage and disturbed splenic function; the leukopenia is the result of the anemia (this condition is common to the majority of severe anemias), the disturbed splenic function and the cachexia resulting from disturbance of gastro-intestinal digestion. The hyperplasia of hemolymph nodes, sometimes found, is an evidence of compensation for lost splenic function. Likewise, the numerous

¹ International Clinics, 1910, vol. iv, p. 222.

red-cell-containing phagocytes seen in the spleen in some cases show the disturbance of the hemolytic function of the spleen. The intermittent character of the process, as mentioned above, is dependent upon the changes in the lumen of the obturated or stenosed vein.

"As to the liver changes in the early and middle stages of uncomplicated cases (absence of syphilis, alcoholism, etc.), these consist of anemia and atrophy of the liver resulting from the loss of the portal circulation. To such an anemic atrophy and the disturbances of function of the liver cells a later cirrhosis of atrophic, or, more likely, interstitial type, could logically follow, adding to the symptom-complex (Banti's).

"There is nothing specific about the liver changes, no more than of the splenic. The spleen, however, usually bears the brunt of the stasis, the origin of the thrombophlebitis being most frequently in the splenic or in the portal vein, extending thence usually into the splenic. The spleen, in such cases, has not the benefit of the collateral circulation set up by the mesenteric branches of the portal in ordinary hepatic cirrhosis; and the gastrosplenic anastomosis thereby becomes extremely large, in many cases enormous. The extreme length and tortuosity of the splenic veins, in some cases, suggests an actual increase in length as well as in diameter.

"Of all the factors of the symptom-complex, the only one that might be the expression of some specific, general, or local intoxication is the phlebosclerosis of the portal trunk and radicles. The two cases of recent thrombosis of the splenic vein occurring in pneumonia and malignant endocarditis show that this phlebosclerosis can result from a relatively recent infection of the portal vein and its radicles. The whole pathological picture points to an *infective thrombophlebitis of portal or splenic veins as the essential feature of all these cases, no matter under what head reported (splenic or portal thrombosis, splenic anemia, or Banti's disease).*

"The symptoms of vague abdominal pain and fever, so frequently met with in the earlier stages of these conditions, the relapses, the intermittent character, the fact that they often follow acute infections, particularly typhoid, malaria, pneumonia, etc., all point to a local chronic infection. The etiology of this infective thrombophlebitis is certainly not uniform. Syphilis is probably the most frequent cause, and the evidences of this disease may be localized in this tract alone. Secondary or primary cryptogenetic pyogenic infections may explain a large percentage of the cases, and the symptom-complex may be a sequel or complication of a number of the infections.

"That a relatively large number of cases of splenic anemia have been reported without any mention of portal or splenic obstruction cannot at this time be taken as an argument in favor of the entity of splenic anemia. It is most likely that the portal and splenic veins were not thoroughly examined; they are not in the usual autopsy. Until it has

been definitely shown that the splenic anemia or Banti's complex can exist without any evidence of obstruction in portal or splenic vein, then my conclusion must hold that the complex is no disease entity. Should such cases be found, then this criterion must fall to the ground in their case, and a new grouping made. *Until this is done, splenic anemia and Banti's disease must be regarded as coördinated symptom-complexes and not individual disease entities."*

If one takes Warthin's point of view regarding splenic anemia and Banti's disease, the following cases from recent literature have interest:

Sutherland¹ gives a detailed account of 2 successful cases of splenectomy for splenic anemia, both occurring in girls, aged twelve and six years respectively. Both children made a smooth recovery after operation, and showed marked immediate improvement in their blood pictures. Whether such cure was permanent cannot be determined, as the cases are too recent.

Gangitano² describes a condition he calls "*peritonitis and phleboscrosis abdominalis with endotheliosis desquamativa of traumatic origin.*" This case had been under observation for a long time before finally coming to autopsy. Following abdominal trauma, the patient, a man aged fifty-four years, suffered severe pain for about three hours, and after staying in bed for four days was again able to resume work. Twenty-five days later, swelling of the abdomen occurred; after two months, paracentesis was performed for ascites; this had to be repeated at intervals. The cause for the constantly recurring ascitic collection could not be determined. A year and a half after the accident, laparotomy was performed. The peritoneum was found 4 to 5 cm. thick, the thickening being due to the presence of a layer of vascular connective tissue. There were intestinal adhesions. The liver, which was covered by fibrous tissue, was not enlarged. The enlarged spleen was inaccessible. Hemorrhage from the hypertrophied subperitoneal connective tissue was profuse and obstinate. The patient felt well for eight or nine months after the operation, then the ascites recurred, making paracentesis again necessary. There was marked weakness, abdominal pain, and finally dyspnea. The patient died three years after the initial trauma, and one and one-half years after operation. Examination of the thickened subperitoneal tissue showed the presence of numerous vessels. The arteries were apparently normal, while the veins showed chronic sclerotic changes, especially in the elastica. One of the most frequently remarked features of the condition was detachment of the endothelium of the intima, in connection with the presence of thrombi (artefacts). These changes in the vessels were present in the veins of the intestine, the stomach, liver, spleen, and part of the kidneys.

¹ Lancet, London, December 24, 1910.

² Deutsche Zeitsch. f. Chir., Band cvi, p. 242.

It is noteworthy that the occurrence of syphilis could be positively excluded. Gangitano interprets the condition as follows: "As a consequence of trauma, a diffuse chronic peritonitis was set up, leading to marked vascular changes, particularly in the form of a phlebosclerosis of the veins."

Momm¹ reports a case of Banti's disease, which is of sufficient interest to bear repetition. A man, aged thirty years, had a Talma's operation performed in 1905. The diagnosis at that time being inoperable splenic tumor. After sojourn in a number of hospitals, he came under Momm's observation in 1909. The symptoms and blood picture at this time justified the diagnosis of Banti's disease. The spleen was extirpated; it weighed 1480 grams. Six months after the operation the patient was reported entirely well, and able to pursue his calling. The following conclusions appear at the end of Momm's article:

1. In Banti's disease, it is not always possible to distinguish between three stages, for the ascites can appear very early at times.
2. The ascites is probably caused by obstruction of the lymph channels from the swelling of the mesenteric and retroperitoneal lymph nodes.
3. At times trauma occurs as an etiological factor.
4. The differential diagnosis cannot be established at present between Banti's disease and thrombosis of the splenic vein.

Rossi² reports that splenopexy performed upon a woman, aged thirty-six years, apparently in the third stage of Banti's disease, resulted in subsidence of symptoms. The ascites disappeared, the spleen grew smaller, the blood picture improved, the digestive functions became normal, and the patient gained in weight. Rossi believes that the patient is sufficiently strong to undergo splenectomy in the first and second stages of this disease, while in the third stage, the powers of resistance are so diminished that extirpation of the spleen becomes too hazardous. Here splenopexy, as suggested by Schiassi, is preferable. It leads to the establishment of numerous collaterals, affording relief to the portal congestion, as proved by diminution in the size of the spleen and the disappearance of ascites. In explaining the improvement of the blood picture, Rossi believes that the quickening of the circulation in the spleen results in an improvement of the blood-forming processes, and in neutralization of the poisons which must necessarily pass through the spleen.

Many pathologists of standing deny the existence of such a thing as Banti's disease. Some of these observers hold that the symptoms described by Banti are merely those marking a transition stage of various intra-abdominal pathological processes, but all unite in stating that the subject is, as yet, a long way from being clear. Consequently, a short résumé of an article by Banti himself, recently published in *Folia*

¹ Deutsche med. Woch., 1910, No. 17.

² Clinica Chirurgica, 1910, No. 1.

Hæmatologica,¹ deserves notice. He states that cryptogenetic primary splenomegaly, which is characterized by a uniform enlargement of the spleen from one to three kilos, marking the beginning of the illness, absence of changes in the lymph nodes, and absence of leukemic changes in the spleen or blood, may be due to any one of a number of causes. In the course of studies extending from 1882 to 1894, and several years following, attempts were made to isolate a class with distinctive clinical and pathological characteristics from the large group of primary cryptogenetic splenomegalies. Such a type of splenomegaly with concomitant liver cirrhosis was found, and it became known as Banti's disease. Since then many other cases of splenic enlargement, due to such causes as biliary cirrhosis, hepatic syphilis, pyelothrombosis, or acute infectious splenic enlargement, have been erroneously reported as examples of Banti's disease. Banti selected cases in which the diagnosis was confirmed by examinations of the spleen obtained either at operation or at autopsy, and in which the etiology and clinical course had been accurately determined.

As regards the *etiology*, there is no determinable factor; the condition is not hereditary; it does not run in families; there are no climatic or regionary influences. In none of the 60 cases cited was there any history of previous trouble of the liver or bile passages, malaria, lues, etc., nor errors in diet or alcoholism. Of these 60 carefully selected cases, 32 were in women and 18 in men. Some of these gave a previous history of acute illnesses, such as pneumonia, exanthemata, etc., from which they had completely recovered from ten to twenty years before.

The *symptoms* show a chronic course, and have been divided into three periods.

Period I lasts from three to five years, and has been called the period of anemia, though anemia is not always present. Either anemia or enlargement of the spleen may appear first. In some cases, on account of the marked anemia, the patient seeks medical aid, and the physician is the first to observe the splenic tumor. In others, the splenic enlargement is the first symptom noted by the patient himself. The spleen is greatly enlarged, hard, painless, and of normal shape. The anemic symptoms vary, but in the main are of usual type. There may or may not be slight fever, there is marked pallor, dyspnea on exertion, general weakness, and occasional hemorrhages occur. Anemia may not appear before the second stage of the disease. Banti states that the subjective symptoms of anemia, such as weakness and lack of energy, etc., may appear before any changes in the blood can be found. During this first period, there are no gastro-intestinal or liver symptoms. The lymphatic glands show nothing abnormal; the urine is normal. Examination of the blood

¹ September, 1910, Band x, Heft 1, p. 33.

for the presence of malarial parasites yields a negative result, and the administration of quinine does not affect matters in the slightest.

Period II is characterized by enlargement of the liver, so that its lower margin is palpable two or three fingers' breadth below the free border of the ribs on the right side. Toward the end of this period the liver becomes smaller, the urine lessens to one liter per day, is concentrated and contains urobilin. The spleen and anemia remain unchanged. There is no ascites or icterus. This second period lasts from twelve to eighteen months.

Period III is marked by the appearance of ascites, which, however, is unaccompanied by either pain or fever. The liver is now small and atrophic; there are hemorrhages from the alimentary canal; there is no icterus, but the skin and conjunctiva have a dirty, sallow hue. Death is due to progressive hemorrhages or to a progressive atrophy of the liver.

PATHOLOGY. *The spleen* is greatly enlarged, weighing from one to three kilos; there is an increase in the connective tissue of the reticulum, resulting finally in the cellular elements being represented by mere dots. There may or may not be changes in the capsule. The spleen shows practically the same condition in all three periods.

The Liver. In the first stage the findings are negative. Early in the second stage it is enlarged, becoming smaller later on. The intra-hepatic portal branches are found to be the seat of a sclerosing endophlebitis; later, there is a hyperplasia of connective tissue showing triangular formation at the points where three liver lobules come in contact. These are near the portal branchings. Still later these triangular collections of connective tissue extend and form rings of fibrous tissue around islands of liver cells (lobules). There are no changes in the bile passages. In the third stage, the liver is much smaller, due to continuing development of the interstitial connective tissue, so that there is practically no difference in the pathological picture between this and Laennec's atrophic cirrhosis.

The splenic vein shows sclerotic patches in the intima, usually observed in this vessel during the first and second stages, and present in the mesenteric vein in the third stage.

The lymph node findings are negative.

The marrow shows changes characteristic of secondary anemia.

Banti lays much stress on the fact that the splenic changes precede the liver changes. The blood picture is that of severe secondary anemia.

Bacteriological and experimental investigation has so far yielded nothing positive. The ascitic fluid, blood, and fresh pieces of various organs were examined carefully for the presence of bacteria, without avail.

Animal inoculation and even transplantation of bits of fresh spleen of dogs gave no positive results. Banti wisely says, however, that

all this is not conclusive regarding a possible parasitic origin of the malady.

Banti's theory of the *pathogenesis of this disease* is as follows:

The unknown, probably infectious agent first localizes itself in the spleen. Inasmuch as the changes in the reticulum are more marked than in the spleen cells proper, and as the changes are most intense at the small arterial branchings, one may conclude that the splenic lesions begin at this point, that is, the infectious agent reaches the spleen through the arterial circulation. Poisons generated in the spleen are responsible for general and local changes.

The general changes consist in anemia and weakness; the latter, as has been previously mentioned, may appear with a normal blood picture. In other words, the weakness and lassitude are signs of poisoning.

The local changes consist in sclerotic endophlebitis of the portal and splenic veins, and the ring-like cirrhosis which has its starting points from the finest branches of the portal vein.

TREATMENT consists, when possible, in splenectomy.

In the first stage, splenectomy is followed by a disappearance of the anemia and weakness; this result is permanent.

In the second stage, splenectomy also cures. Anemia and weakness disappear, and cirrhosis of the liver remains at a standstill.

In the third stage, splenectomy and Talma's operation (Torsini) or splenopexy (Schiassi, Rossi) have been performed with good results at times. Splenectomy is the curative operation; the other procedures are merely palliative. The latter are advisable in the presence of much weakness during the late period of the third stage. If left alone, the patients will certainly die.¹ If, on the other hand, the toxogenous focus (spleen) be removed, and the patient survives the shock of the operation, a cure is certain to follow, provided that cirrhosis be not too far advanced. The occurrence of long remissions after simple paracentesis for ascites has been observed; Banti thinks this due to the formation of adhesions.

Lack of space prevents our going into the details of the blood picture. In closing his article, Banti combats various opinions advanced in criticism of his theory. His argument, where he speaks of the difference between splenic anemia and Banti's disease, is not convincing.

¹ A case was recently reported of supposed Banti's disease which had been under observation for about twenty years, and where spontaneous recovery finally ensued.

GYNECOLOGY

BY JOHN G. CLARK, M.D.

Cancer of the Uterus. The interest attached to the investigation of the cause of cancer is not abating. This is evidenced by the formation of societies devoted to the purpose, and by the multiplication of laboratories founded solely for the study of this dreadful disease.

The second International Congress of Cancer Research was held this year in Paris, under the presidency of von Czerny. Reports from different countries were presented. On February 20, the inaugural meeting of the Dutch Cancer Committee was held at Utrecht, when Dr. Spronck, the Professor of Pathology, was chosen as President.

A committee for the study and prevention of cancer has been formed in Switzerland, under the presidency of Professor Tavel, of Berne. The committee is affiliated to the National Cancer Research Committee, on which it will be represented by two members.

The national importance of the subject is indicated by the message to Congress of President Taft, on April 9. The President asked for an appropriation of \$50,000 for the establishment of a laboratory to conduct investigations into the causes of cancer in fish. The President said: "The very great importance of pursuing the investigation into the cause of cancer cannot be brought home to the Congress or to the public more acutely than by inviting attention to the memorandum of Dr. Gaylord herewith. Progress in the prevention and treatment of human diseases has been marvellously aided by an investigation into the same diseases in those lower animals which are subject to them, and we have every reason to believe that a close investigation into the subject of cancer in fish, which are frequently swept away by an epidemic of it, may give us light upon this dreadful human scourge."

A department of research in cancer investigation has been started at the Glasgow Cancer Hospital.¹ The accommodations for the work include a room for the director of the research, a microscopic room, a chemical laboratory, a sterilizing and working room, and a museum.

An editorial² mentions the recent bequest of Mr. George Crocker, which may total \$1,500,000, for the prosecution of medical and surgical research regarding cancer. The proceeds of Mr. Crocker's estate are to be turned over to Columbia University, in New York, to be used for

¹ British Medical Journal, March 19, 1910, p. 720.

² Journal of the American Medical Association, February 26, 1910, p. 710.

biological laboratory research. With the possible exception of one made to a London institution for the same purpose, it is the largest single bequest to the cause, whether by an individual or by a government.

The St. Louis Skin and Cancer Hospital, founded in 1906,¹ has occupied its new four-story hospital building with largely increased facilities for the study and treatment of cancer and skin diseases. The hospital is entirely charitable, no private or pay patients being admitted. The funds were donated by George Barnard, the founder of the hospital, for whom the institution is to be named. It is complete and modern in every detail, and is especially constructed for the skin and cancer diseases. Eight thousand dollars have been appropriated annually for the department of cancer research, and Professor Leo Loeb has been appointed director of research.

Ewing² asks, "What is the result of all this effort to determine the cause of carcinoma?" After extensively reviewing the study of cancer and the growth of cancer research, he says that, from the standpoint of rational therapeutics, the results of five years' work by the experimental method overshadow those of the thousand years preceding.

To all critics, whether helpful or destructive, the answer must be that there is no prophet directing cancer research. No doubt posterity will be able to look back to the beginning of the twentieth century and point out that this or that piece of work was not in the direct line of progress, but here and now the most mature, although uninspired, human judgment says that genuine progress has been made into the dark domain of cancer pathology by means of the experimental method; that this knowledge could be acquired in no other way, and that these principles must be mastered before the cure of human cancer can be devised or attempted.

In view of the great significance of cancer for the animal kingdom, especially for man, and of the sudden transformation of the gloomy aspects of the problem wrought by the introduction of the experimental method into this field, how dare the layman put obstacles in the way of this progress or obstruct the ray of hope that begins to shine for the unfortunate cancer victim?

THE DEATH RATE OF CANCER. Coley³ has written a paper, the purpose of which is to go over the evidence at our command at the present time, in the hope of arriving at some conclusion as to whether or not cancer is increasing in frequency.

Roger Williams states that the number of cases has doubled in periods ranging from twenty to thirty years, the annual increase averaging from 3 to 5 per cent. Ekblom made a statistical study from the small Swedish town of Fellingsbro. Taking the average from the first and

¹ Journal of the American Medical Association, April 2, 1910, p. 1151.

² Ibid., January 22, 1910, p. 267.

³ Surgery, Gynecology, and Obstetrics, vol. x, p. 591.

last decennial periods of the century, he showed that the death rate of cancer increased from 2.1 per 100,000 living in the former period, to 118 living in the latter.

The statistics of the Scottish Widows' Life Insurance Fund show that the percentage of deaths due to cancer in males has increased from 0.93 per cent. in the period between 1815 and 1844, to 6.88 per cent. in the period between 1888 and 1894. The German Life Insurance Company shows that the cancer mortality between 1885 and 1889 amounted to 3.7 per cent. of the total deaths; among females, 11.4 per cent. Between 1889 and 1895, however, the percentage was 11.4 per cent for men, and 12.9 per cent. for women. The Aetna Life Insurance Company, of Hartford, shows that the percentum ratio of deaths from cancer to total deaths has increased from 2.6 per cent. in the year 1870, to 7.3 per cent. in the year 1906.

In the later statistics from England and Wales, the rural population has been separated from the urban. The cancer rate in the rural districts seems to have suffered much less than in the urban. Considerable difficulty, however, results from the fact that a number of rural cases of cancer go to the city for operation, thus adding to the mortality of the urban population by at least the number of such cancer patients as die from operation. It is probable that the majority of patients who come to the city for operation, and recover, return to their respective homes, where they remain until death.

During the last six years in England and Wales, 176,019 have died of cancer. The death rate in London, per 100,000, between 1851 and 1860, was 42; between 1901 and 1904, was 92. The death rate in Berlin, per 100,000, between 1881 and 1885, was 55; between 1896 and 1900, was 85. In Paris, the death rate from cancer in 1865 was 84; in 1900, it was 120. In New York City, in 1908, the rate was 75.4 per 100,000.

The marked, constant, and general increase in the death rate from malignant growths in the twenty-eight principal cities of the United States from 1883 to 1907 is clearly shown in a paper by Roy F. Edwards. These twenty-eight cities, in 1883, with a total population of 6,097,585, showed 2960 deaths, or a rate of 48.5 per 100,000 living. In 1895 the population of these cities was 9,157,682, with 5377 deaths from cancer, or a rate of 58.7 per 100,000 population. In 1907, with a population of 12,524,695, there were 9686 deaths from cancer, or a rate of 77.3 per cent. Thus, in a period of twenty-four years the death rate increased from 48.5 to 77.3 per 100,000.

Although these figures are taken entirely from the local bureaus of vital statistics, Coley believes that the actual death rate is far greater than the statistics indicate, because among the laity there is a strong prejudice against the name cancer, the result being that in many cases of death from cancer, especially metastatic cancer with internal complications, the family physician, out of respect for this feeling on the

part of relatives, will assign some secondary cause in the place of the actual primary one. This was shown by a study made by Culliot, in France, the actual number known to have died from cancer being twice as great as the number reported.

The effort has been made to question the reality of the increase of cancer, some declaring that it is due to an increase of population, but, as Williams points out, while the population of Great Britain doubled between 1850 and 1905, the cancer mortality increased six times.

Another explanation is, that in recent years, owing to improved hygienic conditions, a larger number of people reach mature life. Williams denies this, saying that the saving of life in modern times has been largely confined to the precancerous period, the death rate of males over thirty-five years, and of females over forty-five years, having remained almost stationary, while the proportion attaining old age has decreased.

Newsholme strongly urges that the increase of the death rate from cancer is due chiefly to improved methods and diagnosis. The increase has been far too uniform and steadily progressive during a long succession of years to leave any basis for such an argument as Williams views it, and taking the increase over the entire period, it is so enormous as to make the explanation seem far-fetched. While it is possible that improved methods in diagnosis may add slightly to the total cancer death rate, these very improvements may also cause subtractions from it, and he shows that in the report of the Registrar-General, as late as 1880, such diseases as fibroid tumor, polypus, and lupus were usually classed as cancer. Since then, these diseases, as well as a number of other conditions at one time regarded as malignant, have been assigned to other causes.

A careful study of the whole subject shows the increase to be a general one, and not limited to a few parts of the body. In other words, intra-abdominal or inaccessible cancer, which would be the type most likely to be affected by improved methods of diagnosis, show even less relative increase than external cancer. In 1868, the death rate for cancer of the stomach per 1,000,000, of thirty-five years and upward, was 283.65 for males and 193.45 for females. In 1888, the rate had increased to 346.15 for males and 277.75 for females, making an increase of 22 per cent. for males and 44 per cent. for females; but for this particular period of life, the general death rate from cancer had increased 50 per cent. At the present time cancer causes more deaths among women than tuberculosis. Taking men and women together, the death rate of cancer is rapidly approaching that of tuberculosis.

A careful analysis of the statistics of cancer which are obtainable at the present time forces one to the conclusion that there is a constant and considerable increase in the number of people afflicted with cancer in all civilized countries.

Ewing¹ also is impressed with the increasing frequency of cancer. He draws attention to the fact that most diseases differ in frequency at different times in their history and cites smallpox, which was once an ever-present scourge, but now is comparatively rare. Tuberculosis, always abundant, has been steadily reduced. On the contrary, cancer seems to be steadily increasing, although the testimony in this regard is somewhat uncertain. Riechelmann has shown that, in the Berlin Hospitals, 20 per cent. of the cases of cancer demonstrated at autopsy were not recognized during life, and since the diagnostic skill of Berlin physicians is probably above the average, there is still room for a 20 per cent. increase in the cases of recognized cancer from improved diagnosis alone.

From 1840 to 1905 the cancer deaths in England and Wales rose from 1 in 129 deaths from all causes to 1 in 17, and in the United States, the cancer deaths increased from 63 per 100,000 living in 1900, to 72 per 100,000 in 1906. The frequency of the disease may be better appreciated from the computation, that in England, of those living at the age of thirty-five, one man in eleven and one woman in eight dies of cancer.

From other sources² also comes the information that carcinoma is increasing. The Registrar-General's report on the vital statistics of England and Wales for 1908, which has just been published, shows an alarming increase in the death rates of cancer. From 0.55 per 1000 of the population in a period between 1881 and 1885, the rate has continually risen until it attained 0.92 in 1908. England occupies an unenviable position with respect to the mortality from cancer, its rate being exceeded by only two European countries—Switzerland and the Netherlands.

DIAGNOSIS OF CANCER. *The Simulation of Neoplasms by Inflammatory Processes.* Some indication of the difficulty in diagnosis which may have been experienced before the use of the microscope was common, is shown by Hamann,³ who has written an exhaustive paper upon the simulation of the neoplasms by inflammatory processes. After first discussing the osseous and the muscular systems, which we will not consider, he calls attention to *chronic inflammatory tumors of the abdominal wall* following hernia operations. They may be due to the presence of silk ligatures. The time of appearance varies from several months to five years after operation. The swellings occur in and about the scar, are spheroidal or ovoid in shape, hard and smooth, and pretty distinctly marked off from the surrounding tissue. They closely resemble dermoid tumors.

Tenderness and pain are slight, though at times more marked than at

¹ Loc. cit.

² Journal of the American Medical Association, January 22, 1910, p. 301.

³ Annals of Surgery, June, 1910, p. 782.

others, and this variability in pain and the presence of small areas of tenderness is regarded as of diagnostic value by Schlosser. Upon incising the tumors, dense connective-tissue masses are found, in the interior of which is a small amount of pus. In 3 cases, ligatures were present.

As an aid in the recognition of the inflammatory nature of such a tumor, may be mentioned the fact that under the influence of rest, heat, and moisture it usually becomes less painful and diminishes in size. A recognition of its true character is important because, if it is regarded as a tumor, its extirpation involves a needless sacrifice of tissue; whereas incision, evacuation of the pus, and removal of the foreign body usually suffices for the inflammatory swelling.

Inflammatory Affections of the Omentum, after ligation of portions of it in operations for hernia and appendicitis, may simulate neoplasms. Coley, Braun, Le Roy, and Bull have described cases in which, months after hernia operations, enlargements of the omental stump formed what resembled malignant growths. These inflammatory tumors of the omentum appear for one to ten weeks after operation. The swelling may be found almost anywhere in the lower abdomen; usually, however, it is in the vicinity of the umbilicus.

The surface is smooth, the mass is firm in consistence, sensitive to pressure, and is not influenced in its position by respiratory movements. If there are no parietal adhesions, the swelling is movable laterally and upward, but not downward; as the intestines lie behind it, there is dulness on percussion. Usually pain is the first symptom, followed by fever, occasionally chills and vomiting; the course of the temperature depends upon whether or not suppuration takes place.

The inflammatory process may undergo resolution in the course of several weeks or longer, or suppuration may occur. In one recorded case, the tumor remained stationary until the patient's death, a year after its appearance. The diagnosis is easily made if one bears in mind the possibility of the occurrence of such tumors, and looks for the physical signs and the symptoms mentioned above. In some cases they have been mistaken for ovarian cyst, enlarged spleen, or a malignant growth; the diagnostic difficulty will be increased if they occur a long time after operation.

Inflammatory Tumors of the Intestines have been described in recent years by Braun, Le Dentu, Gangitano, Robson, Mayo, Rotter, Georgi and others. They have been spoken of by Le Dentu as false cancers. He divided them into four groups: (1) Interstitial colitis, circumscribed in character, and accompanied with hypertrophy resulting in a certain amount of stenosis. (2) Simple pericolitis with adhesions. (3) Diffuse pericolitis with the formation of an elongated mass. (4) Exuberant pericolitis; in this form, the intestine, extraperitoneal connective tissue, and glands are all matted together.

The tumor-like masses which form about chronic ulcers of the stomach

are familiar to everyone, and many of these have been operated upon for carcinoma. Even at operation it is difficult to decide; pseudodiverticula, especially the diverticula of the sigmoid, give rise to inflammatory pseudoneoplasms. The rectum and the perirectal tissues may be the seat of such inflammatory tumors.

In relation to these inflammatory pseudoneoplasms, the author says that, as a matter of fact, it must be admitted that a diagnosis is often practically impossible. The most elect are deceived at times, and the desirability of an exploratory incision in doubtful cases, if the patient is in condition to bear it, becomes apparent. Prognostic errors, as well, are often made in this class of cases, and should the patient subsequently recover, say under some form of treatment by a charlatan, the medical attendant suffers severely in his reputation, and the standing of scientific medicine is lowered in the eyes of the laity.

THE CAUSE OF CANCER. Does the increase in the death rate of cancer indicate its cause in any way? Many attribute the increase of cancerous affections to an *excessive consumption of nitrogenous food or to luxurious living*, and the death rate from cancer is frequently much higher among the rich and the well-to-do. This was illustrated by some of the Irish statistics, which showed that the rate in prosperous Armagh was 104, while in poverty-stricken Kerry it was as low as 26. Coley¹ believes that the increased frequency is best explained upon the basis of a microbic origin, and regards as containing new evidence in favor of this view a paper by Hyslop and Fenwick, on "Cancer in New Zealand."

They say that although New Zealand has the lowest death rate of the world, there is, nevertheless, a persistent increase in the percentage of deaths from cancer. Hyslop describes at length the topography of the district in which his cases were observed—a flat tract, lying between a snow-fed river and a smaller stream. A large portion of the district is seasonally flooded by these streams, and the high mortality from cancer is in harmony with the conclusions of Haviland, based upon a careful study of the geographical distribution of cancer.

It is of further interest to note that six out of thirty-one patients lived in the same house. These six persons were all shepherds, agricultural laborers, or farmers, and they were not related by blood, thus entirely excluding the element of heredity. As regards the habits of the patients, all drank tea with their meals, three times a day, and nearly all had meat three times a day. This naturally leads us to the subject of "*cancer houses*."

Campbell² thinks that statistics which have been compiled, and maps which have been drawn, in relation to cancer houses are quite convincing that the disease is prevalent in certain localities, particularly those lying low and badly drained and situated on the banks of sluggish

¹ Loc. cit.

² British Medical Journal, May 14, 1910, p. 1172.

streams. It was also shown that high-lying districts, especially limestone areas, were remarkably free. Campbell records several interesting cases of cancer, occurring in the same house, among people who were in no way related and had nothing in common except that they inhabited the same house or the same rooms at different times.

A sea captain owned a house in Belfast. His first wife died of an illness the nature of which is not known. The second wife died from cancer of the rectum. A year or so after her death he married a third time. This woman slept in the same room and in the same bed in which the one with rectal cancer formerly lay. After about two years' residence in the house, she developed cancer of the breast, which was removed, but from which she subsequently died. Both these women were under thirty. The man was a fine, strong, healthy fellow, who spent long periods away from home, sometimes as much as two years.

In another instance, an unmarried woman of forty died of cancer of the breast. Her residence, which was a fine one, was bought by a wealthy merchant who took his family there to live. Two years after, a sister-in-law, a woman aged about fifty-five years, died from an advanced and inoperable cancer of the cecum. She had occupied the same bedroom that the woman with the breast cancer had formerly used. The families were not related. He details three other cases in which a similar chain of events occurred.

Another interesting case was that of a man whom he treated ten years ago for cancer of the liver. He was an old bachelor, who for many years had made a habit of collecting old books. After his death, these went to a friend and neighbor. Eight or nine years subsequently, the man who had inherited the books died from cancer of the transverse colon. He consigned the entire library to the flames, having apparently been convinced that he had become infected by handling the books.

The indication of the infectious nature of carcinoma, which may at first sight be taken from such occurrences as these, is somewhat controverted by the fact already mentioned, that the ordinary sanitary measures which control the infectious diseases exercise no such power over cancer, which is prone to attack the well-to-do and the well-nourished, rather than the over-worked and the under-fed. Some caution should be exercised in declaring that cancer is contagious. An editorial¹ remarks that there is not the slightest reason to believe that cancer can be communicated through the medium of clothes, secretions, excretions, or in any other way than by direct inoculation.

The reason for this caution is found in the hardships which may be inflicted upon the victims of cancer when the public entertains an unwarranted fear of contagion. Such misdirected efforts as might result from an exaggerated idea of its infectious nature must be combated by the medical profession.

¹ Journal of the American Medical Association, November 12, 1910, p. 1738.

Traumatism as a Precedent of Cancer. C. H. Mayo¹ believes that cancer is very often the result of chronic local irritation. For instance, carcinoma of the mouth is rare in European women, but common in men, yet in Ceylon and India women suffer greatly from cancer of the mouth because of the chewing of betel-nuts and holding the plug in the mouth. In this country, leukoplakia carcinoma is found mostly among those who use tobacco. Cancer of the skin of the abdomen, a rare condition, is common in natives of Kashmir, who wear abdominal charcoal heaters next to the skin.

Lip or pipe cancer is an example of radiant actinic irritation, and there are numerous tumors from chemical and infective sources. Chimney-sweep cancer and innumerable other special forms are seen. It has been shown also that it may occur in a circumscribed area, and that any epithelial lining or covering may become cancerous. Why this is not still more common following chronic irritation, or, if due to a special germ or parasite, why it does not occur after acute single injuries, it is impossible to say. There is little evidence that a single injury does anything more than call attention for the first time to a preëxisting tumor.

As instances of *chronic local irritation* producing cancer, the author cites chronic subacute appendicitis, diverticulitis, gastric ulcer, vesical papilloma, hypertrophy of the prostate, tumors of the thyroid, fibroid tumor of the uterus, and benign tumors of the breast.

Phelps,² however, after reviewing very extensively the relation of trauma to cancer, concludes as follows: That cancer is primarily dependent upon a cause which is congenital, is hereditary in a certain proportion of cases, and is as inexplicable as the force which determines *ab ovo* the future sex and peculiarities of the individual.

That its development is favored by various indeterminate and non-essential conditions.

That its proximate cause is as yet entirely unknown, and that its future determination will depend upon the possible verification of a parasitic infection.

These propositions are supported by the frequent occurrence of the disease in persons who are still in early or middle life, without hereditary predisposition, and in absolutely normal and mental equilibrium, and this in the absence of any of the accepted favoring conditions.

Heredity of Cancer. Tyzzer,³ in speaking of the relation of heredity to cancer, concludes that heredity plays a role in the general incidence of cancer with regard to species, as is indicated by the frequency of mammary tumors in mice, while they are rare in cattle, which, however, frequently develop primary tumors of the liver and adrenals (Bashford).

The question as to whether tumors are inherited as such is not raised

¹ Journal of the American Medical Association, November 5, 1910, p. 1606.

² Annals of Surgery, May, 1910, p. 609.

³ Journal of the American Medical Association, October 29, 1910, p. 1535.

by modern investigators. Statistical inquiries concerning the inheritance of a predisposition to cancer lack accuracy and are surrounded by almost insurmountable difficulties. The results of these investigations fail in most instances to indicate the inheritance of such a disposition.

The occurrence, in rare instances, of families in which cancer is notably frequent appears to be well established. The occurrence of these families is regarded by many as not remarkable, but as wholly consistent with the law of chance in the distribution of cancer throughout the population. Others point out that if the occurrence of cancer families is established, the question of heredity will not be solved, for peculiarities of environment are not eliminated. In melanosarcoma in gray horses, and in both xeroderma pigmentosum and von Recklinghausen's disease, heredity appears to be an important factor.

Although much of the evidence collected tends to indicate that heredity is not an important factor in the development of cancer, it would appear that this question cannot be definitely settled without the use of more accurate methods than have heretofore been employed. For this work the importance of the experimental breeding of animals cannot be overestimated, for here it is possible not only to obtain accurate data, but to shape the course of the experiment.

An editorial¹ remarks that for further progress in the investigation of the cause of cancer, the thing most needed is a method of experimentally producing cancer at will. A study of transplantable tumors in animals has given us valuable information as to tumor biology, but it does not show the very earliest stage in which normal cells assume anarchistic relation to those surrounding them.

The editor thinks that it is strange, in view of the striking character of *x-ray lesions and the resulting malignant degeneration*, that they have not been more systematically considered by the experimental pathologists as a source of information for the elucidation of tumor etiology. Porter and Wolbach have recently considered at length both the clinical and the pathological aspects of *x-ray lesions*. Wolbach thinks that primarily the changes are of a degenerative character, and that after a certain amount of injury has been done, normal repair becomes impossible. The rays first cause this degeneration in the connective tissue, and, as a result, the epithelium grows down to reach the deeper and less injured connective tissue, whence it may obtain nourishment. In this way the surface integrity is preserved, but with the formation of thickened layers of epithelium, from which, eventually, carcinoma develops.

Wolbach believes that in *x-ray cancer* the epithelial cells slowly achieve an increased power of growth, and as a result of repeated periods of overgrowth, the cells acquire an ability to gain their sustenance at the expense of other living tissue.

¹ Journal of the American Medical Association, January 8, 1910, p. 134.

The editor asks whether the *x*-rays could not be caused to produce carcinoma in the lower animals, and, if so, whether it would not be a big factor in solving the problem of etiology.

Levin,¹ after reviewing the various methods of investigating the cause of cancer, thinks that the only promising one consists of a detailed *study of a large number of clinical cases*; in other words, *clinical statistics*. Such an investigation differs from that which makes use of vital statistics.

By the latter, the aim is to find the complete number of deaths in a given territory during a given period of time, or the total number of cases of disease on a certain day in a given territory. In this way information may be acquired as to the age at which cancer most frequently occurs, its prevalence in a certain sex, and its predilection to civilized countries. Nevertheless, vital statistics shed comparatively little light on the etiology of cancer. For this purpose a thorough analysis must be made of each case of cancer, an analysis which aims not at therapeutics or prognosis, but at the primary causes, as they may be gathered from the data of the anamnesis, or from the complete life history of each patient.

With this object, a statistical investigation was started by the George Crocker Special Research Fund of Columbia University. During the last six months 4000 cases of carcinoma and sarcoma have been collected and analyzed. Levin bases his present paper upon an analysis of 613 cases of cancer of the uterus collected from the foremost metropolitan hospitals. The result of his analysis is indicated by the following tables:

1		
Age.	Cervix.	Body of uterus
20 to 34 years	13.0 per cent.	8.0 per cent.
35 to 44 years	31.0 "	21.5 "
45 to 60 years	49.0 "	55.0 "
Over 60 years	7.0 "	13.0 "
2		
	Cervix.	Body of uterus.
Hereditary disposition indicated . . .	8.0 per cent.	8.0 per cent.
3		
Previous disease of the cervix mentioned	2.5 per cent.	5.0 per cent.
4		
Fibroid found in the uterus	5.0 per cent.	1.5 per cent.
5		
Conditions of childbearing.	Cervix.	Body of uterus.
Virgin	4.5 per cent.	8.5 per cent.
O-para	2.8 "	4.0 "
I-para	12.0 "	10.0 "
Multipara	56.0 "	52.0 "

¹ American Journal of Obstetrics, 1910, vol. lxii, p. 201.

His table No. 4 seems to indicate that the relation between fibroid tumor and cancer of the uterus is only accidental, and from table No. 5 he concludes that the history of childbearing does not differ much between cervical and fundal cancers.

Nor does childbearing, as a whole, seem to have the direct etiological bearing on the disease which is ascribed to it. It is true that the number of cases of cancer in married women is a great deal higher than in single women, but so is the general ratio between married and single women during the cancer age. The following is a table compiled from the twelfth United States census of 1900:

Died in 1900 at the ages of forty-five to fifty-four years:

	Married.	Single.	Ratio.
From all causes	23,719	3410	7.0 to 1
From cancer	3,137	409	7.5 to 1

The ratio between married and single women that died in 1900 is nearly the same in cancer as in other diseases, and compares favorably with the number of cancer cases in his material in virgin and sterile women. It may be interesting to note here, in connection with the advice to repair lacerations as a preventive of cancer, that in two of the cases of cancer of cervix, lacerations had been repaired. Two cases, he says, is rather a small number, but the percentage of lacerated cervixes that become cancerous is also probably small.

Levin does not draw any hard and fast conclusions from his study, and ends his paper with an outline of the data which he has attempted to collect from hospital records.

In another paper, Levin¹ points out certain facts which his investigations seem to show, as follows:

In those organs which cancer may affect in either sex, males were usually more frequently attacked than females. Men also more frequently acquired cancer of the mouth and digestive organs, whereas women were predisposed to cancer of the reproductive organs.

In regard to age, none were exempt from carcinoma, and it is interesting to note that *x*-ray carcinoma usually occurred in young people.

Although cancer was occasionally encountered in primitive races, the American Indian may be considered practically immune.

Occupation undoubtedly plays an important role in the causation of cancer. This was illustrated by carcinoma of the scrotum of the chimney sweep, the bladder tumors of aniline workers, *x*-ray cancer, etc. Previous local disease appeared to have some causative relation to the occurrence of cancer of the skin, of the extremities, of the mouth, and of the breast.

The instances of heredity were so few that it seemed very doubtful that hereditary disposition had any influence at all.

¹ *Annals of Surgery*, June, 1910, p. 768.

As regards infection, in 4000 cases examined there was not a single instance of the endemic occurrence of several cases of cancer in one house; and no more than eighteen examples of "cancer à deux" were found.

INOCULATION EXPERIMENTS. An interesting observation has been made by Haaland,¹ who read a paper before the Royal Society, on February 3. He contrasted the reactions to the implantation of cancer after the inoculation of living and of mechanically disintegrated cells. He described experiments in which cancerous tissue had been inoculated into mice after mechanical disintegration at 180° or at zero C. The experiments showed that a complete disintegration of the cells entirely robbed them of their immunizing properties against a subsequent transplantation of cancer.

The absence of immunizing power did not seem to be a question of dose of the introduced material, because relatively enormous doses of dead material did not induce any resistance. In the same way, the press-fluid, obtained from tumors by Buchner's press, was devoid of immunizing properties. The immunizing property was not bound up with the protein of the cell, but depended upon a different principle. Living cells were necessary to induce a resistance to the transplantation of cancer. It seemed necessary that these cells should not only remain alive, but also even grow for a certain time; without the fulfilment of these conditions, a reaction inducing active resistance was not set up. The same consequences followed autolysis, the action of heat, radium, etc., upon the tumor tissue.

The failure to elicit the reactions of immunity to the transplantation of cancer by devitalized tissues revealed an important difference from the immunity reactions obtained against bacteria and their products, and foreign proteids in general, in which cases the immunizing properties were independent of the vitality of the organisms or cells.

It is interesting to find that the officials of the Cancer Laboratory of the State Department of Health at Buffalo have broken new ground in a recommendation which they submitted to the New York Legislature on February 14.² In this report it is pointed out that immunity to the Jensen tumor may be secured in animals by the use of a specific serum. If the resistance is not awakened by one inoculation, it can be heightened by rapid doses, and in a considerable proportion of cases the immunity can be raised to a point which will bring about a cure. They urge that the time has come when experimentation should begin upon human beings, but declare that the only basis which makes this work possible, is for a patient to submit himself voluntarily, and it is necessary under such conditions that the State should pay for his

¹ British Medical Journal, February 12, 1910, p. 382.

² Ibid., April, 1910, p. 894.

maintenance. A sufficient number of patients must be observed to reach any positive conclusions, and they estimate that ten patients would be the least number which would be of value.

METASTASIS OF CANCER. Von Mihalkovics¹ reports a case of a woman, aged thirty-three years, who was operated on for carcinoma after the Wertheim method. She enjoyed good health for nine months thereafter, but then started to have severe pain in her right side. At the end of three months, when she came under observation again, there was rigidity and a small mass on the right side. The diagnosis of either chronic appendicitis or carcinoma of the ileocecal glands was made. Upon abdominal section, the appendix was found to be bound down and the seat of carcinoma.

Pathological examination confirmed the macroscopic diagnosis. The author believes that metastasis took place according to von Recklinghausen's theory, viz., the lymph radicals being occluded by the cancer cells, dilatation of the vessels occur behind the point of obstruction, the valves then prove insufficient and permit a retrograde passage of the cancer cells. This retrograde movement is probably assisted also, according to Waldeyer, by the fact that the carcinoma cells possess ameboid movement. The author reports this case because it is the first one in literature.

Cohn² observes that in recent years it has been found that carcinoma of the ovary is often a secondary growth, even though it may clinically appear to be primary. It is probably correct, as pointed out by Pfannenstiel, that when bilateral ovarian carcinoma is combined with gastric carcinoma, the ovarian growth is usually secondary.

Cohn reports 4 cases, in only one of which it is evident that he has proved the growth secondary. In most cases of secondary ovarian cancers, metastasis occurs by way of the lymph channels, although some authors believe that, after the growth has reached the peritoneal cavity, cancer cells may spread through the peritoneal lymph channels, and that the cancer cells may enter the ovary through the point of rupture of a follicle. He thinks it justifiable to remove the secondary ovarian growths if they are giving rise to painful symptoms.

Palmer³ calls attention to the fact that in the *treatment of carcinoma of the abdominal organs* it is quite as necessary to have definite *contraindications to operation* as it is to have indications for operation. He calls particular attention to a routine digital examination of the rectum with the patient in the knee-elbow position, and a bimanual examination with the patient in the lithotomy position. He says that by this means, in a series of 435 cases (the Mayo Clinic) of upper abdominal

¹ Zeit. f. Gyn., vol. xxxiv, No. 17, p. 572.

² Monats. f. Geb. u. Gyn., vol. xxxi, p. 333.

³ Surgery, Gynecology, and Obstetrics, vol. x, p. 154.

carcinomata, it has been possible to prove that over 6.5 per cent. were hopeless.

A positive indication of inoperability is found, upon rectal examination, at a point about three to five inches from the anus along the anterior rectal wall (on what has been termed by Dr. George Blumer the "rectal shelf"), above the prostate in the male, and above and behind the uterus in the female. A hard nodular mass may be felt distinctly originating in the peritoneal cavity, single or multiple, and varying in size from a small bean to an orange. Sigmoidoscopic examination shows the rectal mucosa uninvolved. The peritoneal nodes may remain as distinct neoplasms, or they may, through a process of infiltration, form a crescent-shaped area of cartilaginous hardness which partially surrounds the bowel. He has not seen a case that produced any symptoms suggesting stenosis or carcinoma.

While the presence of free fluid in the abdomen often indicates a hopeless condition, because it is the result of a considerable peritoneal irritation (and usually actual involvement), implantation carcinomata are found frequently before free fluid can be diagnosed, and before secondary masses can be distinguished through the abdominal wall.

It must be borne in mind, however, that negative findings are of no value. One must also guard against mistaking fecal concretions high up in the sigmoid and old inflammatory deposits in the pelvis for this condition. Tuberculous peritonitis can be differentiated by the "feel" of the mass, its location being more diffuse, together with the history of the patient. Dr. Blumer cites a case in which a small sub-peritoneal myoma, projecting into Douglas' pouch, caused some confusion. He also calls attention to the fact that Houston's fold in the rectum is sometimes thickened.

In explanation of the secondary growths in Douglas' pouch, the author says that once the peritoneal covering of the primary growth has been broken through, the carcinoma cells are spread in more or less numbers throughout the serous cavity by gravitation, intestinal movements, or the normal circulation of the intraperitoneal fluid. He believes that a fair percentage of these cells will soon find their way to the lower part of the cavity, and because the rectum, on account of its position, acts as a shelf, they will, in many instances, lodge thereon. The tendency to gravitate to the pelvis is more pronounced because most of the patients with upper abdominal carcinomata are able to be about and often do light work.

Of the 435 cases, 307 were carcinomata of the stomach; the remainder affected the intestines, pancreas, liver, and gall-bladder. Of this number, 28 showed secondary deposits on the rectal shelf or in Douglas' pouch, while no secondary deposits were palpable through the abdomen, and, with two exceptions, abdominal fluid was clinically questionable or absent.

In the same series of 435 cases there were 18 of supraclavicular gland enlargement. Thus, 55 per cent. more cases were shown to be inoperable by means of pelvic metastasis than by supraclavicular metastasis. Pelvic metastasis warrants a most unfavorable diagnosis as regards the duration of life.

Rosenstirn,¹ after reviewing the literature and reporting 15 cases which were carefully studied at autopsy, concludes that metastasis from abdominal cancer occurs in Douglas' pouch earlier than from ovarian cancer. He says that the metastasis is influenced by the law of gravity and affects first the deepest part of the cul-de-sac. He does not believe it necessary, in cases of abdominal cancer, that the growth must penetrate through the peritoneal covering, and thinks that carcinoma still entirely covered by serosa can cause implantation by metastasis to Douglas' pouch.

He recommends that the deepest part of Douglas' pouch should be removed in all radical operations for carcinoma of the abdominal organs.

MALIGNANT TUMORS OF THE VAGINA IN CHILDREN. Knoop² describes a case of a child, aged three and one-half years, who had a *sarcoma of the vagina*. It was a very malignant tumor, and recurred within a few weeks after the first operation. The second operation was performed, but a recurrence occurred again within three months, and the child died soon after.

The author says that these malignant tumors in childhood are usually fatal within six months. One case, operated on by Volkmann, is described by Schuchart, and was definitely cured.

The tumors are situated usually on the anterior or lateral walls; sometimes the cervix is affected first; sometimes the posterior vaginal wall is the primary seat of the trouble. The inguinal glands are soon affected. The growth may eat its way into the bladder. Secondary involvement of the rectum has not been noted, but peritonitis, cystitis, etc., have occurred, and distention of the bladder has been caused by compression of the urethra.

A review of the literature shows that the abdominal route was used in operating for sarcoma of the vagina in a child six times, and for carcinoma of the vagina once. The operators followed Wertheim's technique for carcinoma of the cervix. Although these tumors are called sarcomas, they really are mixed tumors. They often begin as polypi, and then take on their grape-like character; for this reason Pfannenstiel called them *sarcoma botryoides*. As soon as the large-sized vesical formation takes place, the tumor spreads rapidly.

The tumor consists of epithelial tissue, smooth muscle, different varieties of connective tissue, elastic tissue, and some undifferentiated cellular structures.

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 113.

² Zeit. f. Geburts. u. Gynäk., vol. lxvi, No. 3, p. 569.

TREATMENT. Recently Vaughan¹ has described the use of a *serum* which he prepares from cancerous material removed at operation. In his report he discusses the etiology of cancer, and gradually leads up to the reasons for adopting this plan.

The author recites the various theories which have been given for cancer, and does not believe that it can be explained upon the parasitic theory. He thinks, in order to satisfactorily solve the production of cancer, cell-life must be better understood.

"What is it," he asks, "that causes any cell to divide and multiply?" In the instance of the simple ameba, we know that this cell may reproduce itself simply by the chemical reaction which occurs between the cell and the surrounding media. Outside influences, either chemical or mechanical, may hasten or retard such division, but the capability of division is inherent to the cell itself. In the case cited such a division must be the result of chemical changes within the cell; no other method of explanation would be satisfactory.

With regard to the cells of the human body, we can also conceive that each cell has within itself the power of reproduction. This power is called into action continually because of the changes normally occurring within the human body. Thus, the epithelial cells of the skin are continually being cast off and again replaced by those of the deeper layers beneath. The same thing is true of the cells that compose every tissue of the body. Some have highly specialized functions, and their chemical content is found to differ widely, but in all the power of reproduction is present to a greater or less degree. A comparative study teaches that this power is inherent to the cell and is not dependent upon any special nervous influence.

Vaughan believes that at times, and because of chemical or mechanical irritation, the multiplying cells tend to continually reproduce and become changed in nature, both physically and mechanically, until they become true autogenous parasites. It has been shown that in some bacterial infections a ferment is formed which is capable of destroying bacteria through the injection of the specific "residue" of that bacterial cell within the human body. With this in mind, he has attempted to induce the formation of a ferment within the human body which is capable of destroying the cancer cell through injections of its non-toxic residue into the body from which the cancer was obtained.

In order to prepare the *cancer residue*, the cancer material is dissected as freely as possible from all surrounding tissues, after which it is ground in a meat grinder. The material is next washed with water, dilute salt solution, alcohol, and, lastly, ether. This process removes salts, fats, wax, several proteid bodies, and traces of carbohydrates. The remaining substance is then heated in a flask with a reflux condenser

¹ Journal of the American Medical Association, May 7, 1910, p. 1510.

with from fifteen to twenty times its weight of a 2 per cent. solution of sodium hydroxide in absolute alcohol, and by this means it is split into a toxic and a non-toxic group. The toxic portion is soluble in the alcohol, the non-toxic is insoluble, and it is with this portion he deals.

This preparation was not used until September, 1907, so that the period of trial is of too short duration to make a report of any value, except in the case of death of the patient or treatment of a patient for recurrence after operation. The author, in his reports, uses only cases which belong to these groups. He gives the details of 8 cases in which the treatments were used, apparently with success. All the patients had definite signs of recurrence when the injections were started. The pain ceases immediately after the first injection. The growth of the tumor was not entirely stopped in all patients, and yet it may be stated truthfully that its rapidity was lessened.

The author has purposely chosen cases of superficial cancer in which a recurrence could be seen, so that the results might be more accurately and quickly estimated. He says that every tumor should be examined microscopically, and the patient preferably treated with the residue from his own tumor cells. This method of procedure should be combined with radical removal, and instituted as soon thereafter as possible.

Fulguration, the plan described by Keating-Hart of treating cancer by electric sparking, was advocated more than three years ago. The originator's communication, according to the editor of the *British Medical Journal*,¹ was modest and cautious; he did not claim to cure cancer, but simply suggested the method as superior to older ones, although some French and German authorities, such as Pozzi and Czerny, were very enthusiastic. The report of Dr. Schulz, from the surgical clinic of Breslau, does not seem to bear out their optimism. Thirteen patients were treated, and none of them apparently derived any benefit. Schulz failed to find any elective specific action of the electric sparks on the cancer cells. Bier, Abel, and Cohn have had practically the same results.

Sticker and Falk² have described a treatment for inoperable carcinoma with *radio-active ferments*, *carboradiogen*, and *carboradiogenol*. Ferments not only build up living cells, but also have the power to disintegrate organic albumin. They seem to be a worthy weapon against malignant new formations. Particularly is this true of *trypsin*, which Blumenthal has shown can digest carcinoma cells in a test-tube. The rapid destruction of tumors in the lower animals noted after trypsin injections appears remarkable. In man, a softening of single carcinoma nodules may be observed after the use of trypsin preparations. The latter are rich in

¹ February 5, 1910.

² Monatsschrift für Geburtshilfe und Gynäkologie, Band xxxii, No. 6, S. 703.

albumin-destroying ferments. When injected, they are unlimited in their action, and even dangerous in some cases.

Sticker and Falk, in order to get a lasting and stable preparation which would not be dangerous, combined the ferments with carbon. This preparation, *carbenzym*, was successfully used in the treatment of surgical tuberculosis. After the discovery of radium, the authors decided to combine carbenzym with radium. This they did, and called the preparation *carboradiogen*. As soon as carboradiogen comes in contact with the body fluids, the radium salt is dissolved, and as a result, the γ -rays are liberated. Carboradiogen is used in powder or tablet form. For injections into tumors, and where a longer reaction from radium is expected, they combine an insoluble radium salt with carbenzym. This preparation is called *carboradiogenol* or *carboradiogenol trypticum*.

In some cases of inoperable cancer there is a breaking down of the carcinomatous areas after the use of these ferment combinations. Carbon, the vehicle used for the combination of the ferments and radium, in a powdered form has the highest absorptive powers for ferments as well as for radium salts. The preparations carboradiogen and carboradiogenol trypticum are a combination carbenzym with either soluble or insoluble radium salts. Radio-ferment therapy combines in this practical way the enzymatic action of the ferments with the lasting ray action of radium.

Offergeld¹ believes that death, in some inoperable cases of carcinoma, is due to the retention of potassium salts, which are direct poisons to the heart. The retention in turn is the result of an insufficiency of a kidney secretion somewhat in the nature of an internal secretion. With this view, he used, in three cases, injections of expressed kidney juice or dried kidney extract. The material might also be supplied, he says, by having the patient eat fresh kidneys.

Statistics of the Results of Operation. A number of authors, during the last year, have reported the results of operation in their cases of carcinoma. One of them is Veit,² who says that, from April 15, 1904, to December 31, 1904, 76 cases of carcinoma were admitted to his general clinic, and 4 cases to the private wards, a total of 80 cases. Of this whole number, 41 were operated upon, 33 by the abdominal route, with 11 deaths, and 8 by the vaginal route, with 1 death. Of the original 41 which were operated upon, 29 survived the operation; of this number, 14 are alive. Of the 22 which survived an abdominal operation, 9 are living and well, and 1 of this number had, in addition, extirpation of carcinomatous glands. Of the 7 which survived a vaginal operation, 5 are still alive. Altogether, he cured 14 cases out of 80, a percentage of

¹ Archiv für Gynäkologie, vol. xci, No. 1, p. 173.

² Monatsschrift für Geburtshilfe und Gynäkologie, vol. xxxi, p. 101.

17.5. The severity of the cases can be seen in that he could operate on only 50 per cent. of them.

Seitz¹ gives the statistics of the cases of cancer of the uterus occurring in the Münchener clinic, Director v. Winckel, for the last twenty years. Unfortunately, there is no uniform distinction made in the report between fundal and cervical cases. There were 1094 cases. A radical operation was performed in 221, or 20 per cent.; 78 per cent. of the radical operations were total vaginal hysterectomies, 13.5 per cent. were abdominal hysterectomies, and 9.5 per cent. were cervix amputations, which Seitz counts in with the radical operations.

The primary mortality was 5.5 per cent. in cervical amputation, 13 per cent. in vaginal hysterectomy, and 30 per cent. in abdominal hysterectomy, an average of 16.1 per cent. The percentage of absolute cure for all cases, computed by the method of Winter, was 5.79; Werner, 5.48. The percentage of absolute cure for carcinoma of the body of the uterus was 30; carcinoma of the cervix and body, 6.8; and for carcinoma of the cervix alone, 1.75.

Franz and Zinsser² report that their percentage of operability was 82. In 70 cases in which the parametrium was not involved, the mortality was 12.6 per cent.; in 82 cases with an infiltrated parametrium, it was 24.4 per cent.; and in 21 cases in which the infiltration extended to the pelvic wall, the mortality was 33 per cent. They believe that the high mortality in cases of carcinoma is due to an infection from the germs lying in the cancerous tissue and the great loss of blood. They do not use any prolonged preparatory treatment, simply curetting the superficial surface of the carcinoma before operation, and cleansing the vagina with alcohol.

They make a great point of introducing their hands as little as possible into the abdominal cavity during operation, picking up the organs and introducing sutures as far as possible with instruments. They isolate all bleeding points before tying them. They have used lumbar anesthesia exclusively during the past four years. This is preceded by an injection of morphine and scopolamin.

From January 10, 1904, to January 1, 1910, they had 245 cases; 200 were operable (82 per cent.). The mortality was 21 per cent. The bladder was injured during operation twenty-two times. In 10 cases, vesicovaginal fistula followed operation; in 5, rectovaginal fistula developed, which healed spontaneously.

The authors have had 19 cases under observation for five years. Three of this number show no recurrence, showing a cure of 18.7 per cent. of this small selected number of cases.

Wertheim³ reports 500 cases of the advanced abdominal operation

¹ Zentralblatt für Gynäkologie, No. 31, S. 1061.

² Archiv für Gynäkologie, vol. xci, No. 3, S. 599.

³ Die Erweiterte Abdominale Operation bei Carcinoma Colli Uteri, Berlin and Wien, 1911.

for cancer of the cervix. Two hundred and fifty of the patients have now been operated upon for five years or longer. The author tabulates the entire series of cases, giving the name, the age, and the parity of the patient; the date and duration of the operation, full notes as to the exact condition found at that time, any deviations from the usual technique, and a note on the postoperative convalescence and the subsequent examinations of the patient at yearly intervals are included.

With this large number of cases as a basis, the author fully discusses the subject, emphasizing the fact that all his cases were cervical and none of them fundal carcinomas. He reviews the history of the development of the operative technique and takes up the moot points of the operation.

1. *The Prevention of Infection from the Growth Itself.* When the abdominal operation for carcinoma was originally employed, the mortality from peritonitis, the result of infection from the cancer itself, was very high. The first effort to overcome the possibility of such an infection was by means of a thorough curettement and cauterization, but in spite of it, out of his first 23 cases, 4 died of peritonitis. Then he adopted a plan similar to Werder's, who finished his operation by removing the uterus through the vagina; but he gave it up on account of the serious bleeding from the paravaginal tissues when an incision was made from below, and because of the time consumed in changing the patient from one position to another. He finally adopted clamps, at first right-angled and later obtuse-angled, by means of which he can absolutely exclude from sight or touch the carcinomatous mass, when the cervix and vaginal fornices are detached. In only 10 of his series of cases was it inexpedient to use them, either because of excessive size of the carcinomatous tumor, high-grade adiposity, or infiltration of the cellular tissue.

At first, he thought that by using clamps the preliminary cauterization and curettement would be rendered unnecessary, but soon found this contradicted by the fact that sometimes, in separating the cervix and vagina from their attachments, a slight tear occurred through the shell of healthy tissue between the cancer and the parametrium.

The curettement and cauterization is done immediately before the abdominal operation and not several days previously, so that bacteria which might be pressed from the carcinomatous tumor into the surrounding tissues do not have time to multiply and cause fresh inflammatory infiltration as is observed occasionally after curettement and cauterization for inoperable growths.

After this preliminary disinfection, the carcinomatous crater is plugged with 1 per cent. sublimate gauze. For the reason that during the subsequent manipulations of the operation, infectious material may be squeezed out of the carcinomatous area into the vagina, when the time comes to cut into the vagina, the sublimate gauze tampon is

removed, the clamps immediately applied, and the vagina below them wiped out with sterile gauze. As the incision is made into the vagina, beginning at one side, a sterile strip of gauze is pushed into it in order to prevent the welling up of any fluid. With these precautions, he has had series of 20 or 30 cases without a sign of infection.

The plan of circumcising the vaginal vault, loosening the vaginal fornices from their attachments, and then sewing the flaps over the cervix, he thinks, adds all the dangers and all the disadvantages of vaginal hysterectomy.

2. *Drainage.* The best route for drainage is through the vagina. Wertheim does not make use of peritoneal drainage unless there has been an escape of pus or very much peritoneal surface has been removed, or there is danger of postoperative perforation of the bowel. He believes thoroughly, however, in draining the parametrial and the paravaginal tissue in order to prevent the collection of blood and other secretions, and employs for this purpose strips of iodoform gauze. These strips are started about the fourth or fifth day, so that they may be entirely removed by the eighth or the ninth. When especially deep cavities have been left in the connective tissues, the vagina is incised sufficiently to provide very thorough drainage. The retention of pus in the subperitoneal tissues occurred relatively seldom—altogether in 18 cases. In 7, the condition was complicated by necrosis of the ureter, which, with urinary extravasation, in some instances, was the primary cause.

It has been stated frequently that subperitoneal drainage leads to necrosis of the ureter. From Wertheim's experience, he would say that drainage has nothing to do with the production of ureteral necrosis. He thinks, on the contrary, that its use has been of distinct advantage in postoperative necrosis. In the majority of cases it has provided a ready route of exit for the urine, and in subperitoneal suppuration it has been possible, usually, to evacuate the pus by dilating the drainage tract with the finger. Only exceptionally has it been necessary to open the abscess by an incision over Poupart's ligament.

There was a fatal result in 7 cases of subperitoneal suppuration; in 1, uremic coma supervened after extirpation of the fistulous kidney; in 1, there was diffuse suppurative bronchitis, with abscess formation in the right lower lobe; in 1, the entire subperitoneal space on both sides was gangrenous; in 1, the cause of death was pyelonephritis; in 1, death was caused by myocarditis and emphysema; in 1, pyemia; in 1, diffuse phlegmonous cellulitis and peritonitis.

From his experience he has made it a rule that whenever fever, pain, or bleeding indicates some disturbance of healing in the subperitoneal space, to make a digital exploratory early. He carries out the same practice where there is any suspicion of ureteral fistula.

3. *Hemostasis.* Hemostasis is difficult, not from extirpation of the lymph glands, but on account of the removal of the parametrium. The

more thoroughly the parametrium is removed, the nearer to the pelvic wall one dissects, the more difficult it is to control bleeding from the veins which are closely applied to the pelvic wall and closely incorporated with the pelvic fascia. By means of what he calls parametrial clamps, which are curved at the tip and have a rather broad compressing surface and very exactly made, this bleeding may be controlled during the excision, and ligatures are easily substituted for them afterward. The clamps are a good safeguard against the occurrence of air embolus, and he will not admit the assertion of Mackenrodt, that by their use more parametrium is left attached to the pelvic wall.

4. *Dissection of the Ureters.* A free exposure of the ureters is the *sine qua non* of the advanced abdominal operation. Finding them is quite easy, commonly. As a rule, their pelvic portion can be seen through the peritoneum, and one need only divide it and push the subperitoneal tissue out of the way. When they do not show through the peritoneum, for instance, when the subperitoneal fat is very abundant or there is thickening of the peritoneum, they are quickly found, usually after cutting through the peritoneum.

The author has adopted the plan of Bumm and Krönig, since his two hundred and twenty-seventh case, who, after ligating and dividing the infundibulopelvic ligament, separate the two leaves of the broad ligament and look for the ureter between them. It is a little more difficult than the method first described, but, as a rule, the ureters are easily located. The advantages of Bumm and Krönig's method are that the ureter is less uncovered, it has more extensive peritoneal attachments, and, at the close of the operation, it can be well covered and protected by peritoneum. In 5 cases, the pelvic ureter could not be found, and it was necessary to locate the vesical part first.

After the ureter has been found, it is followed up to its entrance into the parametrium. This is rather easily done, the connective tissue or the cellular tissue covering it being separated partly by blunt dissection, partly by scissors. The parametrium overlying the ureter and carrying the uterine vessels is now divided above the first finger, which is pushed through the parametrial tissue following the upper surface of the ureter. This maneuver is facilitated if the bladder has been previously separated from the cervix. There is always some risk of tearing one of the uterine veins and provoking active hemorrhage. In 4 cases, the parametrium was so stiff and resistant from inflammatory or carcinomatous infiltration that this procedure was omitted.

After dividing the upper part of the parametrium, the vesical portion of the ureter is accessible, and then a few snips with the scissors, or blunt dissection, will expose the ureter as far as its entrance into the bladder; then complete separation of the bladder, which up to this time has been only partly possible, may be effected.

In advanced cases, the loosening of the vesical part may present the

greatest difficulties, and there are cases in which it must be literally dug out. Curiously enough, however, such a ureter may be free of carcinomatous infiltration. The author has had 7 cases of this sort, in which the late results have been very excellent. Altogether there were only 6 cases in which he deliberately resected the ureter, and in them the resection was proved to have been unnecessary by subsequent microscopic examination.

The author has injured the ureter accidentally in 11 cases; in 3, the injury was simply a longitudinal splitting, which was easily corrected by several fine sutures; in 7 cases, the ureter was cut across; two ureters were present on the same side in 1 case. In another, after freeing the vesical portion of the ureter, the pelvic portion was left unprepared, and was divided later in cutting through the left fold of Douglas. In 2 cases, the ureter was accidentally ligated with the upper part of the parametrium; no attempt had been made to protect the ureter by the forefinger in 1. In 1 case of large pyosalpinx complicating cancer, the ureter was ligated with the infundibulopelvic ligament. In 1 case, the ureter was cut through in freeing the vesical part, which was firmly fixed, and in another it occurred during a very difficult and tiresome operation.

In all cases of transverse division of the ureter (6 resections and 7 unintentional divisions), an effort was made to reestablish its continuity immediately. Eleven times a new implantation of the ureter into the bladder was undertaken. In only one instance was there an undoubted failure of the vesical implantation. In this case the ureter, which had been divided tolerably high, pulled out of the bladder in consequence of tension. In all the other cases the implanted ureter healed faultlessly, or appeared to have healed faultlessly, even though death occurred from other causes. In 2 cases, the division of the ureter was so high that an implantation of it into the bladder did not come into question.

In 1 case of double ureter, the injured one was implanted into its fellow of the same side. In another case, on account of the serious condition of the patient, it was necessary to simply ligate the renal end and drop it.

Ureteral fistula following operation occurred relatively often, *i. e.*, in 32 cases—sixteen times on the left, eleven times on the right, and five times on both sides. They were always ureterovaginal, and usually were manifested immediately by a discharge of urine, of which the patient would complain. When the extravasated urine did not find ready egress through the vagina, there were more or less marked symptoms of retention. By means of the indigo-carmin method, the cystoscope showed the corresponding ureteral orifice inactive in almost all cases, and a ureteral catheter would pass commonly only for a distance of from 2.5 to 4 cm.

A majority of the cases of ureteral fistula developed between the

seventeenth and the nineteenth postoperative day. One case appeared first on the twenty-first day, and one on the thirtieth. In 15 cases the fistula closed spontaneously, even though two of them were complicated by subperitoneal suppuration. The dribbling of urine from the vagina gradually became less and less marked, while its escape from the ureteral orifice of the affected side became more and more evident upon cystoscopic examination. After the fistula had healed, the ureter could still be easily traversed by a catheter. A certain weakness of the urinary stream remained in most cases, and the interval between the spurts of urine was somewhat longer. Stenosis was never so marked that hydronephrosis developed. Closure required usually from four to six weeks. One case healed within two weeks, and 2 cases healed between the third and the fourth month.

When spontaneous closure is delayed, there is danger of ascending pyelitis and pyelonephritis. In 2 cases, which came to autopsy after somewhat more than a month, there was high-grade pyelonephritis. In 3 cases of rapid recurrence of the carcinoma, pyelitis was found at autopsy. In another case, in which death occurred three years after the operation, suppurative pyelonephritis and dilatation of the right pelvis was found. In 4 cases, the kidney was extirpated on account of the symptoms of pyelonephritis, and examination of the kidney afterward justified the operation.

The fear of an ascending infection may lead too early to an extirpation of the kidney. Four extirpated kidneys showed no sign of pyelonephritis. One of them had been removed two months, and three about one month after operation. In all, there had been fluctuations of temperature. Nevertheless, in every case in which a ureteral fistula does not close, there is a considerable danger of an ascending infection.

Ureteral fistulae may depend upon several things—an impairment of the blood supply, and a kinking of the ureter, which causes urinary obstruction, are the most common. By some, the chief cause of ureteral necrosis is said to be drainage, but the author does not incline to this view. Without doubt, surface injuries of the ureter which involve the ureteral sheath and its surrounding vascular supply predispose to necrosis. When the separation of the vesical portion is very difficult, an actual thinning of the ureteral wall may occur from tearing of the ureteral sheath; this should usually be recognized at once and corrected by resection.

Ureteral necrosis occurs sometimes when the separation of the ureters has been easy and it is absolutely certain that even a superficial injury has not occurred. This happened in 12 cases. On the other hand, in 41 cases in which separation of the ureter was difficult, necrosis did not take place. Notwithstanding our imperfect knowledge of the etiology of ureteral necrosis, it is advisable to take the greatest pains to avoid compression or injury of the ureter during operation, to be sure to retain

the ureteral sheath, and to leave the ureter attached as much as possible to the surrounding tissue. Especial care should be observed that no ligature placed near the ureter grasps enough tissue to produce a kink in it.

Although Wertheim has taken pains to adhere to these principles, he has not been able to notice any particular influence therefrom on the production of ureteral fistulas. In his first hundred cases, he had 8; in his second hundred cases, he had 7; in the third hundred, 4; in the fourth hundred, 7; and in the fifth hundred, 6. It must be that in a certain number of cases ureteral necrosis is unpreventable.

They should be treated by careful cleansing and the application of tincture of iodine or silver nitrate. If spontaneous closure of the fistula does not occur within four months, and a diminished excretion of urine indicates an atrophy of the kidney, then operation is to be thought of. Implantation of the ureter into the bladder comes into first consideration, and when this for any reason is unadvisable, or when the affected kidney is already too much involved, nephrectomy is the only recourse. When both ureters are fistulous, there is an extraordinarily difficult situation to face. This occurred in 5 cases. In 2 cases both sides closed spontaneously. The 3 other cases, after efforts to correct the difficulty, died.

The author has observed pyelitis following operation when there was no ureteral fistula, an occurrence which he can explain only upon the supposition that bacterial invasion occurred through the bladder or ureteral wall because of their weakened vitality. In these cases the injection of silver or protargol into the pelvis of the kidney, by means of the ureteral catheter, gave good results.

5. *The Bladder.* The bladder is not separated from the vagina in one step, but in several. First, it is detached about as far as it would be for the ordinary abdominal hysterectomy. Then, after the vesical part of the ureter has been isolated, the lateral parts are easily separable, and a further separation of the bladder from the anterior vaginal wall in the median line presents no special difficulty.

To make this separation, the author uses scissors almost exclusively; a long, slightly curved pair with round points, which, when closed, make an excellent blunt dissector. The finger causes much more bleeding than scissors, and there is more risk of injuring the bladder in cases in which the attachment is close.

By this method, in those cases presenting no involvement or fixation of the bladder, vesical injury transpired in but 4, and immediate suture gave primary healing.

It is entirely different if the bladder is already fixed, and then it happens often enough that, on account of the thinning of the musculature of the bladder wall from a penetration of the growth, the mucosa only lies between the carcinomatous infiltration and the vesical interior.

In such cases, the bladder will be repeatedly opened. When this is suspected, separation of the bladder may be started laterally, working from the vesical portion of the ureter, and in this way a safe line of cleavage may be more easily found. This he has been able to accomplish in 10 cases. In 45 cases, on account of high-grade fixation and infiltration, the bladder wall has been more or less injured. In them all a part of the fixed bladder wall had to be removed with the uterus, so that the vesical wall was left quite thin.

In 18 cases, the bladder was penetrated by an instrument in the course of separation, and, in 3 cases, deliberate resection was carried out. In the entire 21 cases, the opening into the bladder was immediately closed by sutures; 11 healed by first intention, but in 7 union did not occur, and a vesicovaginal fistula resulted; 3 cases died.

In 24 cases the bladder was not opened at the operation, but there was much impairment of the bladder wall; 6 died, and of the remaining 18, 9 developed vesical fistulas. The question naturally arises, whether, in case the nutrition of the bladder wall is likely to be impaired, it would be a good plan to deliberately dissect it. As a fistula may result in spite of resection and suture, the author prefers to invaginate the injured vesical area by drawing the surrounding healthier parts over it with sutures.

Of the 16 vesicovaginal fistulas, 1 healed spontaneously. In the remaining 15, the fistula had to be closed by an operation. The first attempt was not always successful; sometimes two or three were necessary.

Almost always, after operation, there is more or less bladder paralysis, and in a majority of cases the patient is unable to void urine. This continues until she first gets up, and often until later. Even then evacuation of the bladder may not be complete. Only after a number of weeks is the function fully recovered.

With impairment of function, there is a certain amount of cystitis, which is not avoided by the most painstaking catheterization and irrigation. Both result from the traumatism and the disturbance of circulation and innervation to which the bladder has been subjected by the operation. There is nothing which will prevent this postoperative condition of the bladder. Regular catheterization and daily irrigation with a disinfecting solution should be practised from the first day. No effect has been observed from the plan of Krönig, who puckers up the raw surface of the bladder, making it smaller, and then pulls over and attaches the bladder peritoneum to the anterior vaginal wall.

6. *The Large Bowel.* The line of peritoneal incision in the usual operation corresponds to the junction between the close and the loose attachment of the peritoneum in Douglas' pouch. Access to the loose cellular tissue of the rectovaginal septum is then easy, and the rectum may be readily separated from the posterior vaginal wall.

In 2 cases in which the rectum was not sufficiently detached, its anterior wall was caught by the vaginal clamps and opened. A careful suture resulted each time in primary union. In advanced cases of carcinoma, separation of the rectum from the vagina may be very difficult. In 19 cases of this sort, the large bowel was opened on three occasions; in 2, careful suturing resulted in primary healings; in 1, there was a rectovaginal fistula which closed spontaneously. Unlike the bladder, it is very unusual for necrosis of the rectum to occur.

7. *The Regional Lymph Glands.* Wertheim holds that the lymph glands should be removed only when they are enlarged. He believes that two facts are against the principle of completely removing the glands as a part of the operation: first, because it is impossible to extirpate them all; and second, because it is not necessary to do so in all cases. It is well known that glands, scarcely the size of a pea, may be carcinomatous, whereas, on the other hand, enlarged glands may not be involved.

In order to determine whether the regional glands are enlarged, simple palpation is not sufficient. It is necessary to split the peritoneum, lay the vessels free, and separate the cellular and fatty tissue so well that one can take the glands between the fingers.

The author does not adopt the suggestion of Latzko to remove the glands in continuity with the parametrium. Theoretically, this practice is advised in order to prevent a break in the lymph radicles. As a matter of fact, however, this invariably occurs, so that Wertheim makes removal of the glands the last step in his operation. Only in those cases in which there is very well-marked enlargement of the glands does he remove them first.

In the great majority of cases, removal of the lymph glands is easy. They can usually be extirpated by blunt dissection, but if the connective tissue is tough, scissors and forceps may be necessary. Wertheim first takes out the glands in the region of the common iliac, then the external iliac group up to the internal ring, then the glands which lie in the triangle between the external iliac and the hypogastrium, and thence to the obturator foramen. The obturator nerve is often laid free, for in many cases it is actually surrounded by the diseased glands. In but one case was it necessary to resect the nerve. Finally, the sacral region is attacked.

In 15 cases, the carcinomatous lymph glands were closely attached to the iliac vessels. Here the greatest care is requisite. Injury of the iliac veins is very dangerous. In 1 case, secondary bleeding occurred after the patient was out of bed; in 1 case, the external iliac vein had to be ligated; in 4 cases, resection of the vessels was necessary; in 2 cases, carcinomatous glands had to be let alone; in 1, the suspected tissue had to be left attached to the vessels. In order to secure sufficient exposure to take out the regional glands, the author never found it necessary to

use any other than the ordinary median incision. This, however, he carries down as far as the upper border of the symphysis.

8. *Anesthesia.* Anesthesia is a very important part of the operative technique. The relatively large number of cardiac deaths which Wertheim had in his first 200 cases led him to shorten the period of anesthesia as far as possible. To this end he has it begun after the curettement and cauterization, which may be performed without particular pain if one protects the vaginal wall carefully. Fifteen to twenty minutes can be saved. In 33 cases in which a bad heart rendered general anesthesia to any extent undesirable, lumbar anesthesia was used. In the first 19 cases, he used stovain; later, tropacocain. In general, he was very well satisfied with lumbar anesthesia. In 1 case, using stovain, respiratory paralysis occurred. In 2 cases, inhalation narcosis was required also. Using tropacocain, there was total failure in 1, and partial failure in 5 cases.

STATISTICAL RÉSUMÉ. Wertheim has had 1096 cases of carcinoma of the cervix. Five hundred were operated upon; 55 declined operation, 22 had vaginal hysterectomy, and, in 519, the disease was too widely advanced for any hope of cure. This gives a total operability of about 50 per cent.

Operability. As an indication of the possibility of operation, the local condition deserves the first consideration. If one finds the entire pelvis filled with hard masses, or the vagina as far as the vulva turned into a stiff tube, then there is no doubt that the case is inoperable; but if the disease is not so widely advanced, there may be difficulty in reaching a positive conclusion. Involvement of the regional lymph glands by rectal examination is by no means always easy to detect.

Cystoscopy. While cystoscopy has not given a great deal of information in this direction, nevertheless, a prominence of the trigone usually is an indication that the carcinoma has invaded the vesicocervical septum, and conversely, if there is no prominence of the trigone, operative complications on the part of the bladder need not be feared. The consistency of the parametrium is no absolute guide, for induration may be purely of an inflammatory nature, and a carcinomatous parametrium need not be indurated.

Whenever the examination does not give certain information as to the feasibility of operation, exploratory laparotomy is indicated. Not unusually the operator may be surprised to find that he has a less advanced case than he had anticipated, and, on the other hand, sometimes he will find a case inoperable which he had considered operable. Immediately after opening the abdomen, an examination should be made of the lymph glands, the ureters, the bladder, and the rectum. All may be exposed directly to palpation and to view. If this is not sufficient, incision of the peritoneum and exposure of the parts will settle the matter.

The general condition of the patient is also of the greatest importance in deciding for or against operation. In a well-nourished person with a sound heart, one may take the risk of a complicated or long-drawn-out procedure, a thing which would be unwise in a patient who is cachectic.

Exploratory Celiotomy. The author believes that every laparotomy for cancer of the cervix should be regarded at first as an exploratory one. As soon as the incision is made, he palpates the regional lymph glands. If they are enlarged, he determines at once whether it will be possible to remove them, and if impossible, the abdomen is closed and the operation remains as an exploratory one.

If the ureters are much dilated, they show through the peritoneum plainly. The dilatation signifies compression by the carcinoma, so that it is at once necessary to expose the vesical portion of the ureter to see whether it can be separated from the surrounding involved tissues.

Infiltration of the bladder commonly shows itself as a collar-like drawing in and crinkling of the peritoneum corresponding to the position of involvement. An appearance of this sort does not absolutely show that a resection of the bladder will be necessary; nevertheless, injury during separation of the bladder will be difficult to avoid, and the line of cleavage should be started upon either side beneath the vesical portions of the ureters.

Incomplete Operation. In the statistical valuation of cases, an operation dare be considered a purely exploratory one, and counted out of the reckoning of the radical, only when total extirpation of the uterus is not employed. This is true no matter whether diseased structures are left behind or not. Wertheim has had a series of 79 exploratory operations. He tabulates them and gives the name, age, and parity of the patient, date of operation, the anatomical findings, the reason for giving up the radical operation, and the postoperative course. The large number of exploratory laparotomies were due to the difficulty in determining, by rectal or vaginal palpation, whether certain cases were operable; he did not wish to let a single case get by in which there was any hope of success.

Vaginal Hysterectomy. During the period in which he performed 500 abdominal operations, he did vaginal hysterectomy only twenty-one times. In 5, there was high-grade adiposity; in 11, the heart and general condition made the advanced abdominal operation very hazardous; in 5 other cases, there was an extremely early cancer, diagnosticated only by means of the microscope.

Mortality. The mortality of the operation in the first 100 cases was 30; in the second 100 cases, 22; in the third 100 cases, 9; in the fourth 100 cases, 17; and in the fifth 100 cases, 15; a total of 93. Autopsies were performed by Prof. Schlagenhauser, or his assistants, and the causes of death were as follows:

	Cases,
Mechanical ileus	3
Closure of the duodenum by the superior mesenteric artery	1
Postoperative hemorrhage	2
Pulmonary embolism	4
Cerebral embolism	1
Asphyxia	1
Lumbar anesthesia	1
Acute miliary tuberculosis	1
Purulent bronchitis and pneumonia	2
Diphtheria of the colon	3
Uremia after ligation of the ureters	1
Pyelonephritis	9
Peritonitis	39
Heart weakness and cachexia	22
Pyemia	3
Total	93

Nine of the 39 peritonitis cases did not have manifest signs of inflammation, but they were put down as peritonitis because the bowel was paralyzed. In 19 of the cases, the source of infection could be traced with great probability; in 6, the infection came from the primary herd, either from an accidental break of the carcinomatous crater into the field of operation, or a slip in the technique; 1 case of infection was the result of a secondary laparotomy to recover a lost sponge; 4 cases were infected from the incision; 4 were infected from subperitoneal inflammation; 1 case was infected by the rupture of a pyometra; 1 from the tearing out of an implanted ureter; in 20 cases, the origin of the peritonitis was uncertain.

In 22 cases, nothing more was found than myocardial degeneration, fatty heart, atrophy of the heart muscle, and general arteriosclerosis. These were the typical cardiac deaths. Clinically, the heart action became weaker and weaker until it stopped; there was nothing more to observe. Cardiac deaths have been eliminated, since the duration of anesthesia has been shortened. Seven of these heart deaths were in women over sixty.

The Recurrences. There were 78 recurrences in 250 cases which have been operated on for five years or more. Within the first year, 41; the second, 24; the third, 6; the fourth, 4; and the fifth, 3. One hundred and six of the cases have remained free. Among these 250 cases there were 63 deaths immediately, following the operation, and 3 intercurrent ones.

Recurrences take place in a great majority of the cases in the region of the iliac lymph glands. At postmortem, it is difficult to determine, with certainty, the spot at which a recurrence has started. It usually appears first as an irregular mass spread out upon the surface of the pelvic bones. In isolated instances, the masses are so high that they

cannot be reached by rectal palpation. Beginning cachexia, with persistent and localized pain, are definite and reliable clinical indications of a recurrence.

Only a very small minority of Wertheim's recurrences have been found in the scar tissue. A diagnosis of recurrence in the scar tissue is often questionable. The scar tissue left after the advanced abdominal operation is commonly extremely thick and indurated, and a young or inexperienced assistant may mistake it for a recurrence.

The author believes that recurrences in the scar did not occur in his cases because of the preliminary curettement and cauterization of the cancer and the use of vaginal clamps. Apropos of implantation metastasis, he notes that, in 24 of his cases, there was some invasion of the carcinomatous crater during the operation. There were also 11 cases in which he did not use the vaginal clamps or the method of Werder. Among these 35 cases there have been 19 recurrences. This is a relatively higher percentage of recurrence than the general percentage. Nevertheless, he thinks it would be erroneous to conclude therefrom that these were instances of implantation metastasis. Doubtless such accidents occur in the cases most widely advanced. In 9 of this particular lot the regional lymph glands had been involved, and, naturally, they are the ones most predisposed to recurrences. He has not had one single instance of undoubted implantation metastasis.

In this, his experience disagrees with that of others, a fact which he explains by saying that there has not been as much care to guard against infection from the primary herd as he is accustomed to use.

It is true, of course, that the more widely advanced the carcinoma is at the time of operation, the more is a recurrence to be expected. When resection of the ureter or the bladder is necessary, or when a necrosis of these organs occurs after operation, the outlook is unfavorable. Nevertheless, it is noteworthy that a considerable number of widely advanced cases have remained free, and Wertheim by no means agrees with Jacobs, who says that a radical operation is of no value when the cancer has spread to the tissues of the parametrium, the bladder, or the large bowel.

Among the author's 106 cases which remain healthy after five years, there are 10 which had been considered inoperable by very worthy men. In 9 others, free of recurrence, the ureter had to be dug out of carcinomatous tissue. In 3 which remain free of recurrence, the wall of the rectum was already involved, and in 6 other cases the bladder was so markedly fixed that its loosening was very difficult, and a part of its muscularis had to be left behind. In 7 other cases remaining free, the parametrium was so widely infiltrated that in separating it from the pelvic wall it gave the operator the impression that he was cutting through carcinomatous tissue.

The frequently reiterated observation that portio carcinoma has

less tendency to recurrence than cervix carcinoma, he did not find confirmed by his material. While in the majority of cases the starting point of the tumor is no longer certain, there is no doubt that there are very malignant portio cancers which quickly recur even after the most radical operation. The age of the patient, the position of the cancer, and, particularly, its histological structure are of especial importance.

It is generally said that a young person with cancer is especially hard to save. After reviewing his cases with respect to this point, Wertheim concludes that such a statement is erroneous. Among his 106 cases which have remained free of recurrence, are 12 who were under thirty years of age. To him, the youth of the patient appears favorable.

Concerning the histological structure of the cancer and the observation of Pfannenstiel that squamous-cell carcinoma, as a rule, is less malignant than cylinder-cell carcinoma, the author observes that in a majority of his cases the microscopic examination showed squamous-cell carcinoma, cylinder-cell carcinoma being present in but 5 per cent. He further says that he has often found the glands entirely free from invasion when the histological picture which Pfannenstiel regarded as highly malignant was present, and, on the contrary, in the type regarded as less malignant the glands have not unseldom been involved.

Experience has not confirmed the idea that pregnancy has an unfavorable influence, and predisposes to recurrence. Among his first 250 cases, 6 were complicated by pregnancy; 1 case died fourteen days after operation. Of the 5 remaining, 4 have remained free of recurrence. Another case complicated by extra-uterine pregnancy remains entirely well. It is worthy of note that, in the 7 cases complicated by pregnancy, the lymph glands were diseased in only 1.

When the lymph glands are carcinomatous, the prognosis is very unfavorable whether the primary growth is extensive or not. In the first 250 cases, 62 (that is, nearly 25 per cent.) showed carcinoma of the lymph glands. Of these 62, 20 died from the operation, and 1 died from an intercurrent illness. Of the 41 which remained, there are only 5 who are free of a recurrence after five years. Upon close examination of the 5 cases which have been cured, it was found that, in all, solitary or isolated glands were involved. When there was multiple involvement of the glands, the disease invariably returned.

Late Results. By a very careful system of registration, which includes the names of relatives, the place of residence, and occupation of the patient, and the family physician, Wertheim has not lost sight of a single patient. This entails a prodigious amount of work, but is more than compensated for by the completeness of the statistics.

In estimating the results of the operation, the points dwelt upon by Winter and Werner should be borne in mind. In Wertheim's statistics, 57.6 per cent. of those who survived the operation were permanently

cured, and 42.9 per cent. of those operated upon were cured. His absolute percentage of cure, reckoned according to the method of Werner, and the last method of Winter, in which the total number of patients who consulted him during the period in which the 250 were selected for operation, those who died from intercurrent diseases, and those who refused the operation are taken into account, is 18.4.

He compares this result with that of Zweifel, as given by Aulhorn.¹ Zweifel's percentage of absolute cure, according to Werner's method, is 20.46, and Wertheim speaks of it as an extraordinary result, beating his own by 2 per cent.

The author then compares the end results of the abdominal with those of the vaginal operation. It was long ago admitted by Olshausen, the most stubborn adherent of the vaginal operation, that the absolute cure from the old-fashioned hysterectomy would not go over 10 per cent. The method of Schuchart has given better results, and Schauta, by this operation, has attained an absolute cure of 12.6 per cent. The abdominal operation is superior, nevertheless, to even the advanced vaginal operation, because it permits the removal of enlarged glands and careful dissection of the ureter, and enables the operator to remove parametrial tissue which cannot be reached from the vagina.

In other respects, also, the vaginal compares unfavorably with the abdominal. There are more accidental injuries; for example, Schauta had 10.4 per cent. in 336 operations, while Zweifel, in 357 abdominal operations, had only 4.5 per cent.; and Wertheim, in his 500 operations, had only 6.2 per cent. Schauta may not have had as many instances of necrosis of the ureter following operation, but this is easily explained by the fact that the ureters are not well exposed in every case. Furthermore, in the abdominal operation, an injury to the ureter may be at once detected and immediately repaired. In the vaginal operation, this is exceptional. Among 8 cases, for example, Schauta recognized the injury but once.

The danger of implantation metastasis is certainly much greater in the vaginal than in a well-conducted abdominal operation. The mortality of operation is not much in favor of the vaginal method. In Wertheim's last 200 cases, the mortality has been only 11.5 per cent., and series of 20 to 30 cases without a death are no longer unusual. Schauta's mortality was 10.7 per cent., and Staude's, 20 per cent. Convalescence is easier in the abdominal cases. The enormous wound made in the connective tissue by the vaginal operation is easily infected, and abscesses play a part not only in postoperative complications, but also in mortality.

The vaginal operation is harder to learn and more difficult to execute than the abdominal. Wertheim would by no means consider it useless

¹ Archiv f. Gyn., Band xcii.

to remove the regional lymph glands, a point distinctly in favor of the abdominal operation. He has had 5 cases in which the glands were involved and which remained cured after five years, and Aulhorn reported 5 of Zweifel's. Removal of the lymph glands is not as dangerous as it might at first appear; in the second 250 of Wertheim's cases there were 62 cases in which carcinomatous lymph glands were removed, and only 6 of them died as a result of the operation. The author reiterates his statement that complete extirpation of the regional lymph system is impossible. The principle is correct, but the practice is impracticable, and very quickly, after taking up the advanced abdominal operation, he limited himself to the isolation and removal of enlarged lymph nodes only.

Fibroid Tumor of the Uterus. ETIOLOGY. Theilhaber¹ says there have been many statements during the last thirty years concerning an *intimate connection between fibroid tumor and heart disease*. These statements have been founded upon several facts: Relatively many fibroid patients die with symptoms of cardiac insufficiency, independent of an operation; a considerable number of fibroid patients die during, or shortly after, operation, and their death is attributable neither to the anesthesia, nor to the loss of blood, nor to any other disease than a cardiac one; thrombosis and embolism is especially frequent after myoma operations.

Theilhaber cites 17 cases occurring in his own experience. He is convinced that there is a direct relation between uterine myomas and many internal diseases, such as heart disease especially, but also contracted kidney, and apparently also diabetes. He compares the frequency of the complications mentioned occurring in myoma patients, and their infrequency in patients who have ovarian tumors, prolapse, or uterine carcinomas.

In his entire series of myoma patients, there was only 1 case of valvular disease; in 1 case, death was due to an aneurysm; in another, apparently the same cause obtained, but there was no autopsy; both patients were syphilitic. In a majority of his cases of cardiac complications, the trouble was myocardial.

The *cause of myocardial insufficiency complicating fibroid tumors* is obscure. In accounting for it, one must consider the pain and the pressure of the myoma upon the sympathetic plexus—both may influence the frequency and the regularity of the heart's action unfavorably; the mechanical difficulties in breathing and oxidation caused by pressure of the large myomas on the diaphragm, and the contents of the thoracic cavity; the pressure on the digestive organs causing indigestion—in 2 cases this seemed to influence the faulty action of the heart; persistent menorrhagia or metrorrhagia causing degeneration of the heart muscle from anemia.

¹ Monatsschrift für Geburtshilfe und Gynäkologie, Band xxxii, Heft 4, S. 455.

Arteriosclerotic processes in a majority of cases were present. Arteriosclerosis is much more frequent in association with myomas than ovarian tumors or uterine cancers. Ten of his patients were uncommonly fat. Myomas are especially prone to affect the higher classes, and especially Hebrew women. In Hebrews, arteriosclerosis and the cardiac diseases caused by it are extraordinarily frequent. Many Jewesses also are very fat.

These facts lead him to believe that the etiology of myomas is closely connected with *alterations of metabolism* and marked hyperemia of the uterus. A diet very rich in albuminous substances, little bodily activity, etc., are factors in the occurrence of arteriosclerosis, contracted kidney, diabetes, and obesity, but are not the only ones. There is often, also, a certain predisposition to atheroma of the vessels and obesity, as well as to myoma. A number of observations in his own practice indicate this; three sisters suffered from arteriosclerosis and myoma.

A further cause for the coincident occurrence of myomas of the uterus and heart disease, in a few cases at least, is *syphilis*. Theilhaber has had 11 cases of myoma during the last year, in which he could establish a diagnosis of syphilis positively. Two, who died suddenly, had syphilis. Both had borne dead children. The first had an aneurysm, as revealed by autopsy; the second one apparently had the same lesion, but autopsy was refused. It is very likely, in these cases, that the vascular alterations were the consequence of syphilis. On the other hand, syphilitic disease of the vessels may have something to do with the origin of myomas.

Some of the older physicians observed that, occasionally, gummas gave the clinical symptoms of myomas and diminished after the use of mercury. It is wise, in myoma cases in which there is a suspicion of syphilis, to take the Wassermann reaction, and, if the diagnosis is positive, to use antisyphilitic remedies.

INFLUENCE OF MYOMAS ON CONCEPTION. Goetze¹ critically examined 105 cases of myoma in married women, with the view of determining the relationship between these tumors and the frequency of conception. He finds that small subserous myomas do not influence conception at all. The larger the tumor grows, the more it is apt to interfere, but even the largest do not absolutely prevent conception. The most unfavorable effect is exerted by submucous tumors. The likelihood of sterility becomes greater in proportion to the changes occurring in the mucous membrane, which are evidenced largely by hemorrhage. Myomas of the cervix are less likely to prevent conception than myomas of the body.

INDICATIONS FOR OPERATION. Franz² has followed the indications of Winter—namely, hemorrhage, pain, vesical distress, and progressive

¹ Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxxvi, No. 2, p. 340.

² Monatsschrift für Geburtshülfe und Gynäkologie, Band xxxii, Heft 2, S. 153.

enlargement of the tumor—in exposing the cases to operation. This has been more directly applicable to private patients.

From dispensary patients and those dependent upon their own exertions he has removed tumors which might have remained *in situ* for a time without any detriment to the patient, but he has never removed a myoma which had not been giving rise to some symptoms. He thinks, however, that one should not be too particular about this, and that even a little pain is an indication for operation.

Troell¹ cites the histories and the notes of the operation in 100 cases of myoma of the uterus, tabulating them with Essen-Möller's records of 105 cases which have been published previously. All the cases were from the University Gynecological Clinic, in Lund. The indications for operation were:

	Cases.
Hemorrhage in	107
Tumor mass in	44
Pain in	23
Difficult urination and defecation in	16
Suspicion of malignancy in	5
Gangrene in.	3
Leucorrhea in	1
Gigantic size in	1
Mistaken diagnosis, <i>i. e.</i> , ovarian tumor in	5
Total	205

Kerr,² in 200 tumors for which he performed abdominal hysterectomy, found malignant disease in 9, sarcoma in 2, adenocarcinoma of the uterus in 6, and carcinoma of the cervix in 1.

As one can safely reckon on a death rate of not more than 2 per cent. in hysterectomy for fibroids, and as the uterus is useless after the fortieth year, hysterectomy should be the rule, at this period of life, as soon as a diagnosis is made. In this way a large proportion of malignant degenerations will be avoided, for, as a rule, they do not occur until after the fiftieth year. Kerr thinks that in a few cases with little or no disturbance operation might be deferred, examining the case carefully from time to time. Cases which continue to give symptoms, and, above all, bleed, should be operated upon without delay.

TECHNIQUE OF OPERATION AND RESULTS. During the last five and one-half years Franz has had 276 operations for myoma, namely, 16 avulsions of submucous myomas, 25 abdominal myomectomies, 2 vaginal myomectomies, 109 total vaginal extirpations (two-thirds with "morcellation of the tumor"), 121 total abdominal extirpations, and 3 supravaginal amputations.

The results of his operations were as follows: Of 3 supravaginal

¹ Monatsschrift für Geburtshülfe und Gynäkologie, vol. xxxi, p. 295.

² British Medical Journal, January 8, 1910, p. 68.

hysterectomies, all were cured; of 16 avulsions of submucous myomas, all were cured; of 2 vaginal myomectomies after anterior colpotomy, all were cured; of 25 abdominal myomectomies, 1 patient died; of 109 total vaginal extirpations, 1 case died; of 121 total abdominal extirpations, 1 patient died. The entire mortality for the 276 operations was 1.1 per cent.; 3.7 per cent. for abdominal myomectomy; 0.9 per cent. for the total vaginal extirpation, and 0.8 per cent. for the total abdominal extirpation. He states that his results have been superseded by no one, and that in this series of cases during the last five and one-half years, operation has not been refused to any myoma case on account of anemia, heart weakness, adnexal disease, or ovarian tumor.

He thinks possibly the lumbar anesthesia employed may have had some influence upon the result. Lumbar anesthesia was made two hundred and three times. Avulsion of submucous myomas was always done under general narcosis. He was very careful in asepsis, because myoma operations are a good indication of the technique of the operator in this respect. In cases of necrotic myomas which were accessible through the vagina, the necrotic tumor was first removed, and then, if the uterus contained other tumors, it was taken out after the temperature had fallen to normal and remained there for one or two weeks.

He lays especial emphasis upon the technique. The vessels are isolated before tying, so that thick stumps are avoided. He carries out each operation according to a definite scheme of technique. He does not always employ the same operation, that is, the abdominal or the vaginal, selecting one or the other, according to the case, but he insists upon sticking to an established plan of technique. A description of the technique for each is given in his paper.

In abdominal myomectomies, the uterine incision is made parallel to the long axis of the uterus; he does not remove the capsule entirely; he puts in a running catgut suture, which brings together the margins of the peritoneal incision. In the abdominal operations, he makes a transverse celiotomy incision, and if the tumor is so situated that it renders the vagina inaccessible, he enucleates the myoma as the preliminary step. The methods of operation in Troell and Essen-Möller's series were:

	Cases.
Supravaginal amputation of the uterus in	130
Total hysterectomy in	51
Enucleation of the tumor in	16
Extirpation of a pedunculated myoma (myomectomy) in	8
Total	<hr/> 205

Six patients died; all told, a mortality of 2.92 per cent.; 3 after supravaginal hysterectomy (2.3 per cent.); and 3 patients after total hysterectomy (5.8 per cent.).

CHOICE OF OPERATION. Franz prefers total hysterectomy to supravaginal amputation, on account of the possibility of carcinoma. In both vaginal and abdominal hysterectomies, he leaves healthy ovaries *in situ* because it has been his experience that the menopausal symptoms are less marked. He prefers an abdominal to a vaginal operation for cases of enucleation. He never selects the vaginal route for hysteromyomectomy if the tumor rises more than three fingers' breadth above the symphysis, or it is impossible to draw the cervix well down into the vagina.

Clark and Norris¹ believe that, in a great majority of cases, hysteromyomectomy is the operation of choice, except in young women. In young women, myomectomy has an advantage over hysteromyomectomy in that it preserves the childbearing function. Its relative danger, as compared with hysterectomy, depends upon the individual case. Large multiple intramural myomas, which make it necessary to greatly mutilate the uterus and to open the endometrial cavity, increase the dangers of myomectomy. The presence of inflammatory lesions in the pelvis add greatly to the dangers of infection. Small intramural myomas may always escape detection and by subsequent growth make a second operation necessary.

As a result of his experience at Lund, Troell concludes: Enucleation does not guarantee as complete a cessation of the patients' troubles as supravaginal or total hysterectomy. There is always a possibility of recurrence (22.2 per cent. in his series); nevertheless, it is to be advised in young patients when there is a possibility of conception. He cites 2 patients who were operated upon, and who later gave birth, normally, to living children.

In choosing between supravaginal and total hysterectomy, one must bear in mind that the mortality of the total hysterectomy is higher and that the operation is more difficult. Total hysterectomy, furthermore, has the disadvantage of stopping menstruation absolutely. Supravaginal hysterectomy, however, may have the same result upon menstruation, and there is always the possibility that some malignant trouble may complicate the myoma. In the 205 cases which the author reports, 9 were complicated by malignancy (43 per cent.).

As to whether the ovaries also should be removed, Troell says that, in his clinic, the usual procedure is to leave in one or both ovaries in young patients, but in women near the menopause, to remove them. Taking the patients who might have had subjective symptoms after the removal of one or both ovaries, he declares as follows: 30 cases, or 88.3 per cent., had no symptoms; 2 cases, or 5.9 per cent., had symptoms for six months; 1 case, or 2.9 per cent., had symptoms for one year; and 1 case, or 2.9 per cent., had symptoms for two years.

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 398.

Clark and Norris, in 108 cases of uterine myoma, say that whenever hysteromyomectomy is performed upon menstruating women, both ovaries should be spared if possible. It is of the utmost importance that the operation be so performed that the ovarian blood supply is not interfered with, and that the ovaries be left in good position. If it is impossible to carry out these two points with certainty, the ovaries should be removed, as under such circumstances cystic degeneration and other distressing symptoms will arise.

By performing a hysteromyomectomy and leaving one or both ovaries, the severe symptoms of the artificial menopause will be averted. If it is possible to amputate across the cervix at such a level as to leave behind corporeal endometrium, scant but regular menstruation will usually follow. Even though menstruation be abolished, the neuroses and the other unpleasant symptoms of the artificial menopause will be averted if one ovary be left behind. In a series of seventy-five hysteromyomectomies in which one or both ovaries were spared, there was but one patient who complained of symptoms arising from the artificial menopause.

OTHER TREATMENT. Troell has had a series of 189 cases who were not operated upon, either because they were not suitable for operation or because they refused. In stating the results of non-operative treatment of these cases, he divides them into three groups: the first was treated *expectantly by hydrastis*, the second was *curetted*; and the third was exposed to the *x-rays*.

In the first group of 81 cases, 43 (53.1 per cent.) were symptomatically relieved; 24 (29.6 per cent.) were not improved, and the remaining 14 (17.3 per cent.) were improved at the last examination. The tumor was decreased in size in 19 cases (35.2 per cent.), not changed in 17 cases (31.5 per cent.), increased in size in 18 cases (33.3 per cent.). The duration of observation ranged from 2.4 years to 3.7 years. Of the patients in the second group treated by *curettement*, 7 reported back, 5 were improved symptomatically, 2 were not improved. The period of observation varied from 2 to 6.5 years. Curettage was done in these cases on account of the extreme age of the patient, or because a histological examination of the endometrium was required to exclude carcinoma. It was done also in patients with small myomata, who had, in addition, hemorrhagic endometritis.

Röntgen-ray treatment was carried out on one patient only, aged thirty-nine years, sixteen treatments being given. She had been bleeding for four years, and had a tumor which reached to the umbilicus. She suffered from Basedow's disease. Operation was not advised because, after treatment, she was much improved and menstruated normally.

It is curious to note that some men are not yet convinced of the

necessity of operating upon fibroid tumors. Thus, Merkertschiantz, Jr.,¹ asserts that the frequency of malignant degeneration of fibroid tumors is low, and quotes Olshausen as having had, in 64,070 fibroid uteri, only 1.2 per cent. which had undergone sarcomatous degeneration. Hofmeier's statistics, he asserts, show 2 per cent., Doederlein's, 3 per cent., and von Franqué, 4 per cent. of all cases. Only Ulesko-Stroganowa gives 10 per cent.; but it is queer to note that Pfannenstiel, in 100 cases of fibromata, did not see a single case of sarcomatous degeneration. As compared with this, Merkertschiantz declares the mortality of operation, even in the hands of the best surgeons, is 5 to 6 per cent.

The author then proceeds to advocate the use of a preparation from the mammary gland which he calls *Mammin-Poehl*. Mammin-Poehl is not an individual chemical substance; it is a synergetic preparation containing all those substances which are produced in the milk glands. The loosely combined albuminous materials are removed. It is also known as *Synergo-Mammin*, or *Opo-Mammin*, to differentiate it from foreign preparations which are made from the dried and fat-free glands and contain toxins injurious to the body.

Bell, Schober, J. Federoff, and L. Federoff have had good results with this remedy in the treatment of fibromyomata of the uterus. J. Federoff reported 43 cases of fibroid uterus; in 25 the uterus was the size of a two or three months' pregnancy; in 16, the size of a four to six months' pregnancy; and in 2 cases the uterus was above the umbilicus. Complete cure was noted in 33 per cent., a decrease in the size of the swelling in 53 per cent., and negative results in 14 per cent. Bleeding was cured in 82.3 per cent., and pain in 40.3 per cent. During the administration of Mammin-Poehl, meteorism and obstipation were relieved, and the general condition was improved. In one case, complicated by diabetes, the quantity of sugar in the urine dropped from 4 per cent. to 2 per cent. According to Federoff, the substance acts better by subcutaneous injection than when given internally. It acts quickest in postpartum cases.

Federoff injected an emulsion of Mammin-Poehl and normal saline solution into the peritoneal cavity of rabbits, and, later, killed the rabbit and examined the uterus microscopically. He found the uterus decreased in size, the mucous membrane showing few bloodvessels; the submucous coat was greatly infiltrated with bloodvessels, particularly in the posterior portion. The muscular coat showed atrophy, with hypertrophy of the intramuscular elements. The author reports the use of Mammin-Poehl in 50 cases—26 of fibroid uterus, and 24 of chronic inflammation of the uterus. The fibroid patients ranged between thirty and fifty-two years; 6 were primipara, and 17 multipara. The uterus varied in size from a two to a five months' pregnancy.

¹ Monatsschrift für Geburtshülfe und Gynäkologie, 1910, vol. xxxi.

Complete cure, *i. e.*, disappearance of the fibromata, was noticed in 2 cases; decrease in the size of the uterus and the fibromata was noted in 15; bleeding was stopped in 11 out of 12 cases so afflicted; in the 12th case bleeding was diminished.

In 22 cases, regular menstruation was resumed. Pain was cured in 17 out of 21 cases. Discharge was cured in 11 out of 15 cases; in the remaining 4, no change was noted. Six cases had been treated for a long time with ergotine and hydrastis without any result, whereas, after the use of Mammin-Poehl, bleeding stopped, the menses became regular, the uterus contracted, and the growth diminished in size. In 1 case, it even disappeared entirely.

The general condition of all the patients was improved within a short time. Most patients increased in weight, the nervous condition improved, the appetite increased, and constipation was often relieved. Palpitation of the heart, dyspnea, and weakness quickly disappeared.

Mammin-Poehl is given in 0.5 grain dose, three to four times a day, during or after meals (on an empty stomach it causes nausea). To get the full effect, six tablets daily may be given. Subcutaneous injections are more rapid in action. They should be given in the arm. The injections are not very painful; 2.09 to 4.09 of a 2 per cent. solution of Mammin may be used at a time. Injections should be combined with the internal administration of three tablets a day; about forty injections, one daily, must be given over an unbroken length of time.

The results are obtained rapidly, and the author asserts that he has never seen any bad effects. He recommends its use in every case, and considers operation unnecessary except in those in which the remedy has failed to work, or the life of the patient is jeopardized.

Displacements of the Uterus and Prolapse. Several new plans for the treatment of retroversion and prolapse of the uterus have been recommended during the last year. Montuoro¹ describes an operation which he has adopted from Pestalozza. While I repeat this case, it is with the hope that it will be looked upon as a surgical curiosity, and that under no conditions should it be employed.

After the abdomen has been opened and the usual technique of placing sponges, etc., has been carried out, and when he has found how high the bladder is attached to the uterus by means of a catheter, he lifts up a fold of "serosa" at the highest point of the lower segment of the uterus and makes a small button-hole with a pair of scissors. This button-hole is enlarged transversely, not only for the entire width of the uterus, but for a small part of the broad ligament on each side. The flap is then loosened by blunt dissection with the finger, down to the level of the dome of the bladder. Very seldom there is bleeding of any account. If there is, a ligature must be put around the bleeding point. This occurred only once in all of Montuoro's cases.

¹ Zentralblatt für Gynäkologie, 1910, vol. xxxiv, No. 15, p. 497.

After the flap is loosened, the uterus is brought up into ante flexion and a needle with a silk thread is introduced into the fundus of the uterus and then through the middle of the flap about $\frac{1}{2}$ cm. from its free edge. As many stitches as are necessary to attach the flap to the fundus of the uterus are introduced on either side. The incised wound in the "serosa" is completely closed by these sutures. The uterus is held in a position of ante flexion, its anterior surface being covered by two layers of "serosa."

After the operation, Pestalozza recommends that a pessary be worn for eight days to prevent too much traction on the stitches before the new union has taken place. At the end of this time it is taken out. Montuoro has done the operation in four cases with uniformly good results. Of his cases, three got up on the sixth day; the fourth patient was suffering from bronchitis and was not allowed to get up at this time. There was no bladder trouble in any of the patients after the operation. In looking over the literature on the subject, he cannot find any cases of recurrence.

HARRIS' OPERATION ON RETROPOSITION. Another operation which has been proposed for the treatment of retroversion is that of Harris.¹ This is rather an extensive surgical procedure, and, so far, has not been used often enough to determine its value. Harris declares that the essential factor in the production of prolapse of the uterus is the recession of the cervix from the hollow of the sacrum. The uterus, in its normally anteverted position, rests with its anterior surface on the bladder and the vagina, which, in turn, are supported by the muscular floor of the pelvis. The broad ligaments spread out laterally like the wings of an *aéroplane*, while the more or less anteverted position of the uterus is maintained by the round ligaments passing latero-anteriorly from the fundus, and the uterosacral ligaments passing from the cervix posteriorly.

So long as the uterus is maintained in this position prolapse cannot occur. The perineum and pelvic floor may be torn to almost any degree, allowing all the pelvic organs to sag, but, so long as the cervix is held upward and backward in its normal position, the uterus will not prolapse. On the other hand, if the uterosacral supports are destroyed, allowing the cervix to descend along the vaginal canal, prolapse may occur even in the presence of a good pelvic floor and perineum. In the usual case of prolapse of any degree from the first to complete procidentia, it is found that practically all the supports of the uterus are more or less altered, and hence no single procedure will suffice to effect a cure.

His operation is directed to holding the cervix upward and backward in the hollow of the sacrum, where it normally belongs. He thinks that shortening of the uterosacral ligaments is rather unsatisfactory, because

¹ Journal of the American Medical Association, May 14, 1910, p. 1605.

in cases which require the operation these ligaments have been so elongated and torn as practically to have disappeared, leaving nothing but loose peritoneum. It occurred to Harris that the long tendon of the *psoas parvus*, a muscle of little use in the human subject, might be made to act as a substitute for the uterosacral ligaments.

He devised an operation carrying out this idea, which he performed as follows: The pelvic cavity is exposed from above in the usual manner by a median longitudinal, or a Pfannenstiell incision, with the patient in the Trendelenburg position. After packing the intestines well out of the way, an incision is made through the peritoneum along the course of the tendon of the *psoas parvus*, which is readily seen as a distinct white band lying on the *psoas magnus*. The tendon is followed downward and divided at its point of insertion into the pectineal eminence.

Running along almost parallel with the tendon, but well over to the inner border of *psoas magnus*, is seen the genitocrural nerve, which should be avoided. The finger is inserted through the incision in the peritoneum and, passing subperitoneally, raises, by blunt dissection, the external iliac artery and vein from the inner border of the *psoas magnus* and from the brim of the pelvis, so that the finger passes along the lateral wall of the pelvis, beneath the external iliac vessels and beneath the infundibulopelvic ligament, until the end of the finger is felt just beneath the peritoneum in a small free triangular space anterior to the internal iliac vessels and anterior and external to the ureter.

The peritoneum is perforated at this point and a curved forceps introduced, following the finger as it is withdrawn. The end of the tendon is caught with the forceps and drawn down into the pelvis. The same procedure is repeated on the opposite side. The ends of the two tendons are now firmly sutured to the posterior surface of the cervix well down, and the incision in the peritoneum closed. The tendon, as will be seen, passes beneath the genitocrural nerve, beneath the external iliac vessels, beneath the infundibulopelvic ligament, and thence beneath the ovarian vessels and nerves anterior to the internal iliac vessels and into the pelvic cavity above and to the outer side of the ureter; it is thus impossible for it to exert pressure on any of these structures, however much it may be drawn on.

As is well known, the *psoas parvus* is not constantly present in the human subject. Should this muscle be absent, the operation may be modified by the use of a portion of the *psoas magnus*. The *psoas magnus* begins to become tendinous along its inner border well up to the bifurcation of the common iliac artery. The incision through the peritoneum is made a little nearer the iliac artery, and the vessels are raised from the muscle down to the point where it passes over the pubic bone.

A portion of the aponeurotic or semitendinous inner border of the muscle is then cut across at its lower part and raised up as a ribbon-like band about 1.5 to 2 cm. in width, and extending upward to a point

about opposite the bifurcation of the common iliac artery. This band is utilized in the same manner as the tendon of the *psaos parvus*, and the operation is completed as described above.

The effect of the operation is to suspend the uterus firmly high up in the pelvis, with the cervix held well back where it belongs. The uterus is held by an active muscular support possessing all the natural elasticity and resilience of such structures. He has performed this operation twice on the living subject, both of them a month before his paper appeared. While this operation shows ingenuity of thought, it appears too complicated, and one can safely advise a waiting policy as to its general adoption.

MYOPLASTIC RESTORATION OF THE PELVIC FLOOR. A yet more startling operative procedure is proposed by Tandler and Halban,¹ who have devised an operation for marked cases of prolapse in which the muscle of the pelvic diaphragm has undergone considerable atrophy, so that the ordinary plastic operations will not afford sufficient support. They declare, in their article, that uterine prolapse is not the result of any weakness of the suspensory ligaments of the uterus, but an insufficiency of the muscles closing the pelvis. A prolapse partakes somewhat of the nature of a hernia, and the hernial ring is the gap in the pelvic floor which gives passage to the urethra and vagina, which the authors style the *hiatus genitilis*. They are of the opinion that if abnormal widening of this hiatus, caused by tears of the pelvic floor, is not remedied, operations which serve to support the uterus from above are unavailing.

For the narrowing of the hiatus, they believe Heidenhain's operation ideal. For this operation an incision is made back of the posterior commissure, and then, partly by sharp and partly by blunt dissection, the posterior vaginal is freed from the posterior rectal wall. The muscular margins of the hiatus can then be seen, on either side, as well-colored muscular bundles covered with fascia passing upward and outward from the rectum. The free edges of these muscles are now united in the median line with either silk or catgut sutures, usually three to five being necessary. A part of the superabundant posterior vaginal wall is then resected, and a plastic repair of the perineum is made.

The authors condemn the operation of total extirpation of the uterus, and compare it to a herniotomy in which a part of the contents of the hernial sac is removed and the hernial ring is left open. When the levator muscle is so atrophied that even an operation cannot restore it, Tandler and Halban propose a myoplastic operation in which the edges of the *gluteus maximus* are used to close a muscular defect and form a new pelvic floor.

A semicircular incision is made around the posterior commissure and

¹ Monatsschrift für Geburtshilfe und Gynäkologie, 1910, vol. xxxi, p. 77.

the lower external surfaces of the labia majora. From the midline of this incision a second one is carried back to within 0.5 cm. in front of the anus, which it is made to encircle; it is then carried in the median line to the tip of the coccyx. A second incision is made from this point to the tuber ischii on either side. The gluteus maximus muscle is exposed and freed of fat. A portion of the muscle about three fingers wide is separated, and, after division of its external attachment, is turned upward, pulled toward the median line, and sewed in front to the periosteum of the os pubis, centrally to the urogenital diaphragm, and posteriorly to the periosteum of the tuber ischii and to the sacroiliac ligament. The plan is carried out on both sides in the same way.

The inner borders of these transposed flaps are united in the median line from the tip of the coccyx to the anus, and again from the anus to the posterior portion of the vulva. Also a few sutures are passed between the anterior part of the flap and the lateral margins of the vaginal wall. The skin is closed over the wound. A slip of the muscle of three fingers' breadth is sufficient for the plastic work. It is innervated by branches of the inferior gluteal nerve and will not atrophy. It is best not to remove the fat in the ischio-rectal fossæ, but to leave it in place as a pad. It can easily be seen that severe cases of prolapse of the rectum would also be benefited by this operation. The authors have done this operation on the cadaver only, but believe it to be easy of execution and recommend it very highly.

GOFFE'S CYSTOCELE OPERATION. The plan proposed several years ago by Dr. Goffe,¹ and used by him continually, is the basis of an article which he has written during the last year. He feels that the problem of treating cystocele and procidentia has not been satisfactorily solved. He believes that the failures are the result of an error in the fundamental ideas concerning the conditions mentioned. The usual teaching has been that the pelvic organs were supported from below. Goffe thinks that they are suspended. He draws attention to quadrupeds, such as the horse or the dog, and says that no one hesitates for a moment to recognize the fact that their pelvic organs are held in place by ligaments. He thinks that the floor of the pelvis is for the purpose of filling in an anatomical space, and to assist in parturition and defecation by lifting the perineum over the head of the fetus in one instance, and over the fecal matter in the other.

He insists that when the uterus and the bladder are in a normal position, the pelvic floor exercises no influence whatever in their support. He believes that all the abdominal viscera are held in place by their ligaments. To support this, he calls attention to the occurrence of prolapse in nulliparous women where there is no rupture of the pelvic floor. He also ascribes the absence of prolapse in complete tears of the

¹ Transactions of American Gynecological Society, 1910, p. 61.

perineum to the support afforded the uterus by its ligaments. He does not believe that a descent of the uterus occurs after lacerations of the perineum because its support has been destroyed, but because there has been introduced a new force, not in existence before, that drags and pulls upon the uterus; and this is a rectocele.

When a rectocele forms, he says every straining at stool forces down the anus and exerts traction upon the posterior vaginal wall; this, in turn, pulls upon the uterus, dragging it down into the axis of the vagina. As to the cause of cystocele, he believes the bladder is held in place by its ligaments, and that one large support of the bladder is the uterus. The ligaments hold up the uterus, and the uterus in turn supports the bladder. This is accomplished by the direct attachment of the bladder to the anterior wall of the uterus, and by the firm insertion into it of the upper end of the vaginal wall. In addition, he says the fascia lata comes down from either side, passes underneath the bladder, and suspends it as in a sling or in a hammock.

In cystocele there are two conditions, namely, a descent of the uterus and a hernia of the base of the bladder through the vaginal sheath. The author then calls attention to the physiological contraction and expansion of the bladder, and says that the operation he has devised restores the base of the bladder to its normal immobile position, and, at the same time, allows the upper half to expand and contract as physiology requires. This he accomplishes by dissecting the anterior vaginal wall from the bladder until the latter is quite free throughout its entire base and sides. It is then separated also from the face of the uterus and the peritoneum is torn transversely out onto the broad ligaments.

Through the peritoneal opening thus made, the fundus of the uterus is placed in a normal position and secured by shortening the round ligaments. Next, a point is selected in the median line of the base of the bladder wall, which, when carried up to the torn edge of the peritoneum on the anterior face of the uterus, will take up all the slack in the base of the bladder, making a comparatively straight line from the urethra to the uterus. A suture is passed through these points, catching the tissues mentioned and the corresponding torn edges of the vesical and uterine peritoneum. This suture is not tied at once.

Two points are then selected on the base of the bladder, one at either side on a transverse line with the first selected point and equally distant. Through them similar sutures are passed and carried through a point on the torn edges of peritoneum on the surface of either broad ligament, or through the round ligaments sufficiently distant from the middle point to take up all the slack in the base of the bladder from side to side. The sutures are then tied successively, beginning with the middle one. Their effect is to stretch the base of the bladder taut and smooth in every direction.

The fascia along the median line of the vaginal incision, and the

mucous membrane as well, are then trimmed off on either side sufficiently to remove the overstretched and ruptured part of the fascia, and secure for support the strong uninjured part of the fascia latum. These freshened edges are then stitched together and the upper ends of the vagina flaps are attached to the uterus.

To secure the uterus against the disastrous pulling of a rectocele, the floor of the pelvis is restored. When, from atrophy and in extreme cases, the normal sustaining qualities of the ligaments are hopelessly lost, the author removes the uterus, and afterward stitches together the broad ligaments across the pelvis, taking in all the slack necessary to make them taut. Upon this newly constructed plane of tissue the bladder wall is spread out and stitched, and thereby receives its support. To this also is attached the upper end of the vagina after it has been resected. The rectocele is then treated in bad cases, the anterior rectal wall being tucked in by means of buried sutures.

LATZKO'S LEVATOR SUTURE. An operation has been described by Latzko¹ which he calls the levator suture and regards as a typical operation for prolapse. He has tried the operation in over 100 cases, and has been led to his plan by the work of Halban and Tandler. He makes a transverse incision along the posterior commissure. He separates the posterior vaginal from the rectal wall as far up as the vaginal fornix. He then divides the entire length of the undermined vaginal wall in the median line. He resects the excess of tissue of the posterior vaginal wall. The anterior wall of the rectum, the connective tissue and the musculature of the perineum are then plainly exposed to view. The borders of the levator ani, especially in its lower part, are united to its fellow of the opposite side by sutures which are tied in the median line. The borders of the incision in the posterior vaginal wall are then united and the operation is completed.

So far as one may judge from the illustration which accompanied Latzko's paper, his operation does not present anything very new, at least to the American gynecologist. It seems as if, in Germany, plastic operations have not been as elaborately developed as they have been in this country.

Schiffman and Elsler¹ believe firmly in an operation of this sort which they style as a direct suture of the levator. They report 134 cases of operations for prolapse of the uterus, of which number they subsequently examined 87. Fifteen had been operations for total prolapse, and 13 had been for milder cases. Of the 15 total prolapse operations, 3 had recurred. Of the 33 mild cases, only 1 had recurred. There were 39 cases in which operation had been done without direct suture of the levator. Six of these were cases of total prolapse, and, of the 6, 3 had recurred. In

¹ Monatschrift für Geburtshülfe und Gynäkologie, Band xxxii, Heft 3, p. 330.

² Ibid., p. 335.

the 33 milder cases, only once was there a recurrence. There did not seem to be any difference, in the mild cases, whether the levator had been sutured separately or not; but in the bad cases of total prolapse, 80 per cent. were cured when the levator was sutured separately, whereas only 50 per cent. were cured when it had not been sutured separately. They believe, therefore, that in cases of total prolapse the direct suture of the levator sling is of considerable importance.

INTERPOSING THE UTERUS BETWEEN THE VAGINA AND THE RECTUM. Kraatz¹ has introduced a plan of interposing the uterus between the rectum and the vagina in bad cases of rectocele when the muscle and fascia of the rectovaginal septum are much atrophied. The technique of the operation is as follows:

A median incision is made through the posterior vaginal wall from the introitus to the cervix. The mucous membrane is separated on both sides from the rectum, and then the peritoneum of Douglas' cul-de-sac is opened transversely. The fundus of the uterus is drawn out, the tubes are resected, and the fundus is depressed beneath the flaps of the vaginal mucous membrane which are sewed over it. The redundant portions of the vaginal flaps are resected. It is unnecessary to cover the uterus entirely, although it is desirable to cover the angle of the retroflexion.

The author has employed the operation in 6 patients, ranging in age from thirty-seven to fifty-one years. All recovered nicely. Four were examined after one year, and found entirely cured; 1 had a recurrence four months after the operation, and in 1 there was a slight dropping down of the uterus at the end of the year.

In connection with the interposition of the uterus, the author insists upon a careful perineorrhaphy and the proper operative correction of cervical conditions.

EXOHYSTEROPEXY. Solieri² declares that shortening of the round ligaments is not entirely satisfactory as a means of suspending the uterus in cases of prolapse. Dohern had 5 per cent. of recurrence after this operation. Complete hysterectomy is a major operation and not always successful. Schauta calculates 54.5 per cent., and Herff, 51.77 per cent. of failures after hysterectomy. Rahut had 82 cases of recurrence out of 137. The author believes in the abdominal exohysteropexy in cases of marked malposition and total prolapse of the uterus. He puts the patient to bed for five or six days previous to the operation, in order to relieve congestion and edema, and to treat erosions.

The operation consists of drawing the uterus through the peritoneal incision and fixing it to the anterior abdominal wall by sutures which pass through the rectus muscle and fascia on either side and the lower

¹ *Zeitschrift für Geburtshilfe und Gynäkologie*, vol. lxvii, No. 2, p. 391.

² *Ibid.*, p. 274.

part of the posterior surface of the uterus. The peritoneum and the rectus muscle and fascia are then closed above and below and attached to the corresponding sides of the uterus. A sort of couch is made in the subcutaneous tissues to accommodate the fundus, and the skin is closed over it. Suitable plastic operations are done from below.

The author reports 16 cases—4 severe retroversions with cystocele, and 12 cases of prolapse. Two developed hernias above the fixation point of the uterus, and 1 died three days after the operation from uremia.

HYSTERECTOMY FOR PROLAPSE. Jolly¹ in discussing the operative treatment of total prolapsus, performs hysterectomy when there are myomas in the uterine wall, when there is marked metritis, and when the uterus is too small to act as a wedge. He reports 33 cases of hysterectomy for total prolapse; the youngest patient was aged thirty-eight years, and the oldest seventy-three years. In 13, the uterus had been completely prolapsed, and, in 20, the cervix had been presenting at the vulvar orifice. There were 3 deaths, 2 from pulmonary embolism and 1 from diabetes. Within three months to a year there had been no recurrences.

PERINEORRHAPHY AND CONTRACTION OF THE VAGINA. Schabak² reports that in the last twenty-five years in von Ott's clinic all cases of uterine prolapse have been treated by colpoperineorrhaphy and contraction of the vagina. The operation was done 516 times. In addition to the colpoperineorrhaphy, amputation of the cervix was performed 126 times, excision of the cervix 67 times, and anterior colporrhaphy 90 times; 509 patients (99.3 per cent.) left the clinic cured; 3 patients only did not show improvement because the suturing had been faulty, and 4 died; 156 cases have been followed, 60 of which have been personally examined. The average time following operation was six years. There were eight recurrences, making 94.6 per cent. of absolute cures.

INTERPOSING THE UTERUS BETWEEN THE VAGINA AND BLADDER. Some interesting observations have been made by Bröse concerning the results of the Watkins³ operation. This plan of procedure, which abroad is styled the Wertheim-Schauta operation, he says originated with W. A. Freund. In old women he turned the uterus "upside down," *i. e.*, in a position of complete retroflexion, forced it through a posterior vaginal incision, and sewed it to flaps of the anterior and posterior vaginal walls. On each side of the uterus a channel remained for the drainage of uterine secretions. Freund's operation was modified by Fritsch; he delivered the uterus through an anterior colpotomy incision and sewed it to flaps of the anterior and posterior vaginal walls. He also left two openings—one on either side of the uterus—for the carrying

¹ Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxi, No. 1, p. 19.

² Zentralblatt für Gynäkologie, No. 46, p. 1485.

³ Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxvi, No. 2, p. 409.

off of uterine secretions. Both of these operations prevented coitus. Wertheim, to overcome this objection, sewed the inverted uterus to the anterior vaginal wall. He covered it with vaginal flaps, only partly or not at all. Schauta made vaginal flaps just as in anterior colporrhaphy; then, after drawing the uterus through an anterior colpotomy incision, interposed the uterus between the vagina and the bladder.

Bröse makes a long incision through the anterior vaginal wall from the urethra to the uterus, and a small transverse incision at the uterine end of the first incision. The redundant and attenuated part of the anterior vaginal wall is separated from the bladder and resected, leaving enough to cover the uterus. The next step is to free the bladder from the cervix. This is, technically, the hardest part of the operation. The separation is extended to the sides of the cervix so that no diverticulum will be formed which might cause a cystocele after the operation.

Before the vesico-uterine peritoneum or plica is opened, all bleeding points must be carefully secured. Lichtenstein has shown that if hemostasis is faulty, a hematoma may form and produce a recurrence. After the vesico-uterine peritoneum has been opened, the body of the uterus is pulled forward, while the cervix is pushed backward. When the uterus has been delivered, if the patient has not passed the climacterium, she is sterilized; the tube is divided about 0.5 cm. from its uterine extremity and a wedge-shaped piece is resected from the uterine stump; the wound is closed neatly with stitches. The bladder peritoneum is then attached to the posterior wall of the uterus near Douglas' pouch. Thus the uterus is rendered extraperitoneal, and the peritoneal cavity is closed.

If the cervix is much elongated, amputation is performed. The author, however, attributes two cases of recurrence to amputation of the cervix, and therefore does this operation only in case the elongation is very pronounced. Before suturing the uterus, it is very important to see that it fits snugly in its new position, otherwise interference with its blood supply and necrosis might occur, as in a case of Döderlein. If the uterus is too large, a wedge-shaped piece is excised from the anterior uterine wall.

Three sutures of heavy catgut are passed through both vaginal flaps and the musculature of the uterus as deep as possible; so that the stitches will not cut through, the needles are introduced some distance from the edges of the vaginal flaps. The first stitch is just under the end of the urethra, and catches the anterior surface of the fundus of the uterus. The second stitch catches the middle of the body, and the third stitch the uterus, just above the internal os. The stitches are not tied until all have been placed. In sewing the vaginal wall (which is done carefully), a little of the uterine tissue should be caught in each stitch so that the uterus and vagina lie closely apposed and there is no dead space. The vaginal border of the transverse incision is then sewed to the cervix and colpoperineorrhaphy performed.

This operation, too, need not prevent coitus nor menstruation if properly done. In its new position the uterus supports the bladder. The cervix is pressed down on the levator plate by intra-abdominal pressure, and the fundus of the uterus acts as a plug to the anterior portion of the hiatus genitalis.

The author reports 44 cases, all performed in the last seven years. One patient died on the eleventh day after operation from pulmonary embolism. The primary thrombosis was not found. Schauta and Lichtenstein point out that embolism of the pulmonary artery is especially prone to occur after prolapse operations from the large veins of the hemorrhoidal plexus, which are easily opened during a colpoperineorrhaphy. They should be avoided, therefore, during the operation, or, if it is necessary to cut through them, they should first be doubly ligated.

The prognosis of the operation is favorable. Sharpenack, in 100 cases, had no deaths. All healed by first intention. In a few there was a slight elevation of temperature, probably due to the absorption of extravasated blood. Patients were kept in bed for fourteen days. Bröse reports 32 cases which were examined personally some time after operation; 15 were incomplete, and 17 were complete prolapses. There were 2 slight and 3 marked recurrences. He blames amputation of the cervix for the recurrence in 2 cases. He says that had he left the cervix, it would have given the uterus a purchase on the levator plate and exposed it less to the mercy of intra-abdominal pressure.

The percentage of absolute cures was 84.4, a better result than that from the ordinary operations. The results are never as bad as those of total hysterectomy, in which Bumm had 25 per cent. of recurrences; Döderlein and Asch, 20 per cent. The mortality of total hysterectomy is also much higher. The author thinks that the percentage of cures will be increased if the cervix is not amputated and if great care is taken in the posterior colporrhaphy.

Another author, von Franque,¹ reports a series of 15 cases in which a wedge-shaped resection of the body of the uterus was carried out in connection with the operative treatment of prolapsus of the uterus accompanied with metritis. This operation was described in *PROGRESSIVE MEDICINE* several years ago. After the wedge-shaped operation, the uterus is interposed between the bladder and the vagina after the fashion of Watkins or Wertheim. In all his 15 cases, with the exception of 3, there was elevation of temperature following operation, and sometimes it was quite marked. In all his cases the wound became infected. He emphasizes the importance of catching all bleeding points. It would appear from his report that the result of the operation, in his hands, had been rather unsatisfactory.

¹ Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxvi, No. 3, p. 599.

LATE RESULTS OF OPERATIONS FOR RETROPOSITION. A very comprehensive review of the results of vaginal and abdominal operations for retroversion of the uterus has been written by Adler.¹ The cases were operated upon at Schauta's clinic in Vienna. Altogether, there were 304 cases. Of these, 228 were operated upon by a vaginal method, 73 by laparotomy, and 3 by the inguinal route. As many of the women as possible were examined, and those who were inaccessible to examination were communicated with.

The time which had elapsed since the operation varied between one and ten years. The vaginal operations which were undertaken in 228 women were either direct vaginal fixations, high or low, or a shortening, or a fixation of the round ligaments, or a combined method.

High vaginal fixation was carried out in 34 cases—15 movable and 19 fixed. Of the movable ones, 8 were examined; 6 showed the uterus in good position; in 2, it was faulty. Of the 19 fixed cases, 12 were examined; in 6, the uterus was in good position; in 6, it was not. There were 31 cases of low vaginal fixation—16 movable and 15 fixed. Of the 16 movable cases, 5 were examined; in 1 only was the uterus in faultless position. Of the fixed cases, 6 were examined; in 2, the uterus was in ante-position.

Out of 22 cases of intraperitoneal shortening of the round ligament, by Wertheim's method, there were 17 movable and 5 fixed cases. Of the 17 movable cases, 6 were examined; in 4, the uterus was in good position. Of the 5 fixed cases, 3 were examined; in 2, the retroversion had recurred.

Of 18 cases in which shortening of the ligament was combined with direct fixation, there were 13 movable and 5 fixed cases. Of the 13 movable cases, 5 were examined; in 2, the uterus was in good position. In 2 of the fixed cases an examination was made, and in both the result was faulty.

Of 8 cases in which the round ligaments were fixed directly at their origin to the anterior vaginal wall after sagittal colpotomy, 4 cases were examined; 2 were in good position.

Of 44 cases of fixation of the loop of the round ligament in the outer angle of a transverse colpotomy incision, there were 31 movable and 13 fixed cases. Of the movable cases, 21 were examined, and in 14 the result was good. Of the fixed cases, 7 were examined, and in all but 2 there had been a recurrence.

Of the 71 cases in which a loop of the ligament had been fixed to the vagina in the neighborhood of the urethra, 63 were movable and 8 were fixed; 48 of the movable cases were examined, and 44 were in good position; 5 of the fixed cases were examined, and only 1 of these was in good position.

¹ *Monatsschrift für Geburtshilfe und Gynäkologie*, Band xxxii, Heft 3, p. 298.

Looking over the results, he believes that vaginal operations should not be selected for retroversion cases which are fixed.

In regard to the occurrence of pregnancy and the course of labor following these operations, 130 patients come into consideration; 43 became pregnant; 36 occurred in 94 cases of movable retroversion, and 7 were among 36 cases of fixed retroversion. None of the women complained of pain during pregnancy. There were 3 cases in which there was a disturbance during labor. In 1, the difficulty was due to a narrow pelvis; in 2, the trouble was attributable to a high vaginal fixation, and this operation should not be employed in a woman who may conceive. The best results of any of the vaginal operations follow the plan of drawing the round ligaments through a slit near the urethral opening in the anterior vaginal wall.

Three types of abdominal operation were used. Of 14 cases in which direct ventrofixation (Czerny-Leopold) was performed, 11 cases were examined. Recurrence had taken place in only 1. Only 2 of the 14 cases had been movable retroversions. Of 9 cases in which Olshausen's method of suspension was done, 6 were examined, and in only 1 case was the displacement recurrent. Two of this series only had been movable; 41 of these were fixed, 6 were movable. Thirty-three cases were examined afterward, namely, 27 of the fixed and 6 of the movable ones. In none of these cases was there any recurrence. Of the women who were examined afterward, among 7 there had been twelve pregnancies. One of these had had a tubal pregnancy and was operated on. All the other labors transpired easily.

Adler believes firmly in the method of Doleris as modified by Schauta. This method consists of making a transverse incision through the fascia. A pointed artery forceps is thrust through the fascia of the rectus and the peritoneum about 2 cm. to one side of the median line, and the ligament is caught from 2 to 5 cm. from the cornu of the uterus. The round ligament is drawn through the perforation until at least 2 or 3 cm. of it lies upon the anterior surface of the fascia. After the loop of ligament is drawn out on each side, it is fastened to the anterior surface of the fascia with two or three silk sutures. Among 40 of the women operated on by this method, 9 became pregnant. There was no pain during pregnancy, and aside from one tubal rupture, nothing pathological occurred in either pregnancy or labor. Adler declares that the procedure of Doleris is simple, has no bad results, and is the operation of choice. He does not believe that retroflexion requires treatment unless it is causing symptoms, and thinks it a good plan, in case of movable retroversion, to replace the organ and introduce a pessary. If the symptoms are relieved by the use of a pessary, it is quite certain that the retroversion is accountable for the trouble, and then operation may be advised.

LOCAL ANESTHESIA IN PERFORMING THE ALEXANDER-ADAMS OPERATION. Kraatz¹ has performed the Alexander-Adams operation in 13 cases under local anesthesia. The evening before the operation the patient is given veronal, 0.5 Gm.; and one-half hour before the operation, 0.02 Gm. of morphine subcutaneously. The uterus is brought up into position and supported by a Hodge or a Thomas pessary. The usual methods of cleansing, augmented by the tincture of iodine, are carried out.

For anesthesia, he uses a freshly prepared 0.5 per cent. solution of novocain-suprarenin. Starting at the mons veneris, he injects the solution subcutaneously as far out as the anterior superior spine, using 5 cm. for this purpose. Then he injects 5 cm. into the region of the internal abdominal ring. The needle is held perpendicularly and is inserted about 1 cm. above the middle of Poupart's ligament. The third injection of 5 cm. is made directly into the inguinal canal. Anesthesia occurs in from five to eight minutes, and lasts from one to one and one-half hours, so that the operation may be started soon after the injection. He employs the ordinary technique for the Alexander-Adams operation, using Michel's clamps in closing the skin. The patients are allowed to get up on the third day. On the sixth day the clamps are removed, and the skin is painted with iodine. The pessary is removed on the eighth day, and the patient is discharged on the tenth.

Pelvic Inflammatory Diseases. **THE BATH AS A SOURCE OF INFECTION.** Whether a tub bath may be the source of uterine infection is a question of considerable practical importance. It has more bearing in the field of obstetrics than in that of gynecology. Nevertheless, after some gynecological operations, especially dilatation of the cervix and the introduction of a Wylie drain, it is important to know whether tub baths can cause an infection of the uterus by the entrance of tub water into the vagina and the cervical canal.

Haines² made some experiments in this direction. It has been claimed that bathing water does not enter the vagina unless there is a vaginal tear or a widely gaping vulva. Haines being inclined to disbelieve this statement, added a culture of *Bacillus prodigiosus* to the bath of a number of women. After the bath cultures were made from the vagina. Cultures from points low down in the vagina did contain the bacillus, while those from higher up were negative. None of the patients had relaxation of the vaginal outlet.

ACTINOMYCOSIS. Wagner³ reports a case of actinomycosis of the uterine appendages, reviews the literature of the subject, and comes to the following conclusion:

¹ Zentralblatt für Gynäkologie, vol. xxxiv, p. 1129.

² Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxvi, No. 3, p. 59.

³ Surgery, Gynecology, and Obstetrics, vol. x, p. 148.

Actinomycosis of the uterine appendages is probably always a secondary infection from the gastro-intestinal tract, most frequently from the appendix. The mode of secondary infection is by infiltration, penetration, continuity, and contiguity.

Actinomycosis of the ovary and tube in old cases is marked by dense, connective-tissue formation, which may simulate various adnexal diseases. The gross macroscopic and microscopic picture often resembles that of tuberculosis.

Repeated bacteriological examinations, and sometimes long and tedious ones of the same specimens, are necessary to insure a correct interpretation of suspicious pathological material. Inoculation with pure cultures into the animal is not attended with success. Only the injection of actinomycotic pus or the ingestion of material upon which actinomycosis is grown will prove successful in the production of actinomycosis in the animal.

Actinomycosis does not travel by the lymphatics, and probably not by the blood route. The prognosis is favorable if the disease is circumscribed, the most usual form in the uterine appendages. The *treatment* consists in radical extirpation and free drainage, the application of tribromphenol-bismuth, or irrigation of the fistulas with copper sulphate. The internal administration of large doses of iodide of potassium, up to 75 grains a day, exerts a positive healing effect.

A careful study of apparently innocent pus from pelvic disease, as well as excretions from obstinate fistulas after laparotomy for ovarian and tubal pus infections, may result in the discovery of actinomycosis more commonly than has been the case heretofore; as a consequence, different treatment may be inaugurated which will insure, perhaps, a higher percentage of final cures.

RUPTURED PYOSALPINX. Bovée¹ reports a case of acute diffuse suppurative peritonitis caused by a ruptured pus tube. It is a very rare condition, and in a moderately careful review of medical literature Bovée has been able to find only 55 cases. The gravity of the condition is shown in the high mortality, 58 per cent. dying with or without operation. An inquiry into the *causes* of the rupture of a pyosalpinx shows that violence of some sort was reported in most cases. In some, it was not more than a jolt attending transportation to the hospital. Sometimes the traumatic element was childbirth; a few followed curettage; 2 were the result of a bimanual examination of the pelvis; 2 were produced by coitus, and another was the direct result of heavy lifting. In regard to the *symptoms*, those cases in which rupture occurred during labor were clouded by the symptoms of labor. Usually, however, the patient has had pelvic inflammatory trouble, but has not remained in bed. While at her duties, or perhaps under other circumstances, she suddenly

¹ Surgery, Gynecology, and Obstetrics, vol. x, p. 406.

experiences excruciating localized pain, perhaps a chill and collapse. Fever and a rapid thready pulse follow if death does not soon supervene, and distention of the abdomen, together with the general symptoms of diffuse peritonitis is not long delayed.

If the surgeon has been familiar with the pelvic contents before the accident, a pelvic examination may show that a tube which was full and tense has become empty and flaccid. If the rupture occurs during labor, a considerable softening may be distinguishable in a mass which had been felt at the first examination. The symptoms of peritonitis appear so promptly that the condition may be readily suspected. The cause of the peritonitis would then have to be learned by a process of exclusion, although a knowledge of the antepartum symptoms and tubal conditions will markedly assist in reaching a correct diagnosis.

In non-puerperal cases the previous history of pelvic infection accompanied with suppuration, the absence of any evidence of pregnancy, especially tubal, together with the rapid appearance of the symptoms of diffuse peritonitis, should be sufficient for a diagnosis. When the right tube has thus ruptured, it has been mistaken for fulminating appendicitis. The previous history will be an important element in making differentiation. In those cases in which the vermiform appendix is involved simultaneously, the differentiation or possibility of diagnosing both conditions is not always present.

The *prognosis* is bad. Much depends upon the resistance of the patient and the promptness of surgical interference. All the 18 cases which were not operated upon, died; 38 were operated upon, and 14 of them died. The mortality rate for operation during the first day was 21 per cent.; the second day, 100 per cent.; the third day, 67 per cent.; and after the third day, 57 per cent.

TREATMENT OF PELVIC INFLAMMATORY DISEASES. A very novel plan, and one which at first sight appears dangerous, is that of Aulhorn,¹ who says that in May, 1908, Zweifel injected a methylene blue solution into the uterus of every patient on whom he was about to do a total hysterectomy, just prior to the operation. In each case, he found that the solution reached the ends of the tubes. The author, who is Zweifel's assistant, then was struck with the idea of *injecting the uterine cavity with antiseptic solutions for the purpose of curing adnexal diseases.*

He thought that the solution should be one which would not have any ill effects on the peritoneum, for Zweifel's experiments had shown that it often exuded from the fimbriated extremity. He chose a colloidal silver, namely, *argentamin*, a solution of silver phosphate in ethylendiamin, in 2 per cent. solution.

He used a syringe which was easy to sterilize and held about 2.5 Cc. The tip had a slight curve and numerous perforations along its

¹ Archiv für Gynäkologie, vol. xc, No. 2, p. 213.

sides. After antiseptic precautions, the tip was introduced through the cervix and pushed up to the fundus, when the solution was injected with gentle pressure.

The author treated 123 cases in different stages of tubal disease. Some had a simple salpingitis or perisalpingitis, and some were cases of pyosalpinx with the tube as large as a fist. Gonorrhea was the chief cause. No douching or bathing was combined with this treatment. Absolute cure in a case of pyosalpinx cannot be expected, because a fibrous change has already taken place which results in a tubal thickening, and this remains persistent, although the pain may disappear.

Of the 123 cases treated, 108, or 88 per cent., were cured of all their symptoms. Marked improvement was noted in 7 patients, and little or no improvement was noted in 8 patients. Examined objectively, there was a complete cure in 89 patients, 72 per cent. Marked improvement was noted in 16 patients, little or no improvement in 18 patients, and an increase in the symptoms in 1 case. Of the 123 cases, 9 could not be treated as often as the author considered desirable; deducting this number, there were 114 cases, and 83 were cured, or 78 per cent. Sixty of the patients had a pyosalpinx the size of a hen's egg or larger. Of this number, 46 were objectively cured, that is, the tube had diminished in size and was painless upon pressure. As 7 of these 60 patients went home before the treatment was completed, they should be excluded; this makes his percentage of cure 86.

Only patients in whom an infection had reached the tube were injected, because he did not want to carry infection from the cervix into the uterus. Patients who were acutely ill, having an elevation of temperature over 37.6°C ., cases of acute pelvic peritonitis, and the like, were not injected. Under such circumstances the patient was put to bed and an ice-bag was placed over the abdomen. When the acute symptoms had subsided, the injections were begun. After the treatment, the patient was kept quiet, and no examinations were made.

For the first three or four times he injected 1 to 1.5 Cc. of the solution under very light pressure, drawing the syringe back as he injected the fluid. Pain lasting one-half to two hours usually followed the first three or four injections. Oftentimes the pains are very severe. In 7 of his cases, he was compelled to use morphine. After the third or fourth injection, usually there was very little or no pain. The pains were described as cramp-like in character, probably due to irritation of the uterus and not because the fluid touched the peritoneum.

The patient was kept in bed for a few days after the first injection, and then allowed to go about. The author treated 8 cases, with good results, which were not sent to bed at all. At present the patient is kept in the hospital for one week until she becomes accustomed to the injections. It is amazing to observe the rapidity with which the symptoms of the pelvic trouble disappear. The author has never had a

cure from less than fifteen injections, usually twenty-five to thirty being necessary. A large pyosalpinx would require usually forty injections, and in 3 cases he had to give sixty.

He injected his patients daily, with the exception of Sunday and during their menstrual periods. Thus, the treatment usually extended over four to five weeks. In the ambulatory cases the treatment lasted longer, because they were very irregular in coming for treatment, and because at home they did all kinds of work without resting.

Nine patients who did not improve were operated upon later. A year and one-half have elapsed since the treatment in 26 cured cases, six months to a year in 17, and three to six months in 20. Pregnancy occurred in 5 cases; 1 aborted at the fourth month.

The author believes that argentamin kills the gonococcus and causes an active hyperemia of the pelvic organs. During the course of treatment the cases show a tendency to bleed profusely at the menstrual time, and the cervix is often livid in color. He compares this hyperemia to that attending the Bier treatment.

In the cases which were operated upon after the injections had been tried, he found evidence of the absorption of bands and adhesions. In order to excite hyperemia and absorb the adhesions in cases of adherent retroposition, he tried intra-uterine injections of the following mixture: Iodine, 0.3; potassium iodide, 3; spirits, water, āā q.s. ad 100. In 6 cases, the uterus became freely movable after varying lengths of time, usually after about twenty-five intra-uterine injections.

The author appreciates the fact that intra-uterine injections are condemned generally, but he has used this treatment now three thousand and five hundred times, and has seen no evil effects therefrom. The advantages of the method are that it requires little time, and the patient is not necessarily confined to bed. It must be performed skilfully and carefully.

Certainly there must be some doubt as to the correctness of Aulhorn's reckoning in this matter, and it would seem likely that he was fortunate in not having any harm come from his treatment, and we believe that patients were cured more by natural processes than by his injections. It is certainly true that a majority of pelvic inflammatory diseases have a tendency to progressively subside under the influence of rest, attention to the bowels, etc. Personally, we would be more inclined to accept the practice of Goth,¹ who reviews the cases of *inflammatory adnexal tumors*, 700 all told, that occurred in the clinic of Szabô, from January 1, 1893, to December 31, 1908. Twenty-five cases of tuberculosis of the adnexa are excluded.

The *treatment* prescribed was as follows: Rest in bed flat on the back, absolutely; an ice-bag to the abdomen as long as there was any pain

¹ Archiv für Gynäkologie, vol. xcii, No. 2, pp. 300 to 360 inc.

upon bimanual examination. In very severe cases, the ice-bag was applied constantly; in less severe ones, twice daily for two or three hours at a time.

When exudate could be felt near the vault of the vagina, cold vaginal injections, about 20 liters of water at a temperature of 10° to 11° C., were used twice daily. Vaginal injections were ordered also when the abdominal wall was very fat and the surface cold was unlikely to reach the pelvic organs. If the ice-bag was uncomfortable, cold compresses were tried.

Examinations were made every week. As soon as the pain disappeared and the temperature fell to normal, and there was no tenderness on pressure, an effort was made to absorb the exudate. This consisted of hot abdominal compresses and hot vaginal douching twice a day. The temperature at first was moderate, but was gradually increased to 45° to 50° C. Ichthyol tampons (10 per cent. to 20 per cent. ichthyol in glycerin) were introduced into the vaginal vault and allowed to remain for twenty-four hours. The treatment was repeated every second to third day, depending upon the irritability of the vaginal mucous membrane. If the discharge contained the gonococci, protargol (20 per cent.) was preferred.

When hot vaginal douching had no effect, the patient was put in a hot bath, temperature 35° to 40° C. In 31 cases in which the discharge was persistent, intra-uterine treatment was carried out. Cotton on a swab was saturated with 10 per cent. argentamin, 20 per cent. protargol, 10 per cent. zinc chloride, or tincture of iodine, and applied to the endometrium. In 13 cases there was a reaction. Cases which bled persistently and did not respond to treatment were curetted.

Proper nourishment and regulation of the bowels were held to be very important. Anemic cases were given some form of iron. When the patient was nervous, the syrup of hypophosphites or the bromides were prescribed. Analgetica or morphine was given to relieve pain. Often-times aspirin was found to act as well as morphine. Ergotin, hydrastis, and stypticin were prescribed to control bleeding. Under this plan of treatment it required an average of fifty-six days to cure the patient. The minimum was eighteen; the maximum, two hundred and thirty-nine days. The author's records show that febrile cases improve more rapidly than afebrile cases.

Sequestration and Drainage for Ante-uterine Pelvic Abscess. Kelly¹ reports a method of treating an ante-uterine pelvic abscess by sequestration and drainage. He says that ante-uterine abscesses, that is, abscesses somewhere between the round ligaments and the uterus behind, and the pubic bones and the symphysis in front, and having, therefore, some close relation to the bladder, are among the rare forms of gynecologic

¹ American Journal of Obstetrics, vol. lxi, p. 921.

logical infection, and he has seen only a small group of them in a long experience. Such abscesses may arise from a pyosalpinx displaced over in front of the uterus, with or without a backward uterine displacement. The abscess also may be located in the anterior uterine wall, or in the cellular tissues between the uterus and the bladder. After finding these abscesses, either previous to or at operation, it may be wiser to open them through the anterior vaginal wall, with or without the guidance of an abdominal incision.

In a case of considerable size in which the abscess was so located that it could not be conveniently reached from below, Kelly opened the abdomen, walled off the affected area with gauze, evacuated the abscess, and then drained it from above after marsupializing or shutting off this portion of the abdominal cavity. In doing the latter, the round ligaments on each side were sewed to the anterior abdominal wall, beginning near the internal inguinal ring, and coming in toward the recti. The cornua of the uterus were also fastened up to the abdominal wall. A drain was placed through Douglas' pouch.

A valuable résumé of the subject of treatment of pelvic inflammatory trouble has been given by Clark and Norris,¹ who base their remarks upon 190 cases. They advise, in almost every case, a course of preliminary treatment before operation. By this method some cases will escape operation entirely, while the others can be operated on more easily, more quickly, and with less mortality. A greater number of cases will also be found suitable for conservative operation. If possible, four to six weeks of normal temperature and blood counts should precede each operation. If pus be present which can be reached easily without traversing the peritoneal cavity, it should be at once evacuated. In a small percentage of cases, the symptoms may be of such a character as to preclude the possibility of any delay. Accuracy of diagnosis and a careful study of the cases will, however, show that the proportion requiring emergency surgery is extremely small.

The end results of salpingostomies are disappointing. Pregnancy rarely takes place, as the newly formed ostia quickly become occluded and cause a recurrence of symptoms.

Conservation of a grossly normal tube in the presence of diseased appendages on the opposite side offers good results, especially if a course of preliminary treatment has been followed out prior to operation. Conservation of macroscopically diseased tubes is unsatisfactory. Conservative ovarian surgery offers excellent results, provided that the ovarian circulation be not impaired and that the organ be left in a good position. This is strikingly exemplified in their series of forty-eight double salpingectomies when one or both ovaries were spared, none of these cases requiring a second operation.

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 398.

In selected cases, ovarian resection offers excellent results. A small amount of ovarian tissue left behind will usually avert the sudden onset of the menopause. The reason many resected ovaries become cystic is because of interference of the blood supply.

When it is found necessary to remove both ovaries, a hysterectomy should also be performed. Such uteri are useless, and often cause subsequent trouble.

If it is necessary to remove the uterus, and one or both ovaries can be spared, their preservation will prevent the unpleasant symptoms of the artificial menopause. For although menstruation will cease, the neuroses, which are the worse symptoms of the menopause, will not appear.

NON-OPERATIVE TREATMENT. *The Yeast Treatment of Leucorrhea.* Abraham,¹ in 1902 and 1904, drew attention to the treatment of leucorrhea by injections of yeast. He found that when certain bacteria were brought into contact with the yeast, they were destroyed within certain periods of time. Thus, the gonococcus disappeared in six hours, the proteus vulgaris in sixteen hours, the streptococcus in thirty-two hours, and the staphylococcus in forty hours. He is sure that the yeast possesses bactericidal properties.

The yeast may be used in a liquid form for irrigations or injections, in a semisolid form mixed with sugar, or in a solid form mixed with a solid material which will dissolve at the temperature of the body and liberate the yeast. The author, after experimenting with these various forms, found a yeast powder the most satisfactory. He insufflates it against the vaginal walls.

A glass speculum is introduced into the vagina, and the cervix and the vaginal walls are thoroughly cleansed with cotton. From 2 to 5 grams of the powder are then blown against the portio and the vaginal walls, or 3 grams of the powder are inclosed in the soluble elastic gelatin capsule placed directly in front of the cervix and held in place with a tampon. The site of the disease decides which of these methods should be employed. Capsules are best for inflammation of the cervix and the vaginal vault, whereas insufflations are to be preferred when the disease principally affects the lower part of the vagina and the vulva.

In some cases he alternates the use of the powders and the capsules. He has used the method in 200 cases, and gets better results than are obtained by the use of disinfectants, such as chloride of zinc, lysol, iodine, or silver.

Cold Vaginal Irrigations. Alexandron² has used cold irrigations in certain cases of atony of the uterus or the uterine ligaments. Cold irrigations produce contraction of the pelvic structures by irrigation of the sensory nerves.

¹ Monatsschrift für Geburtshilfe und Gynäkologie, vol. xxxi.

² Ibid., Band xli, p. 466.

He employs an apparatus somewhat like a Leiter's coil, which is shaped to fit the vagina and has an inlet and an outlet tube. The irrigation is given for one-half hour, the temperature of the water at first being 25° C. and then gradually reduced to 10° C.

He believes that cold irrigations will be found valuable in all cases in which it is necessary to stimulate the action of unstriated muscle, whether it be in the uterus, the vessel walls, or the supporting structures of the uterus. Hot vaginal douches are better if it is desirable to stimulate absorption from the pelvis. He recommends cold irrigations in cases of subinvolution and for the control of metrorrhagia.

The Application of Heat to the Pelvic Organs by Means of an Electrical Apparatus. Sellheim¹ applies heat to the pelvic organs by means of an electrical current. He makes use of an internal electrode which is introduced into the vagina or the rectum, and an external one which is made to conform to the surface of the lower part of the abdomen by the pressure of a small sandbag. The degree of heat is regulated by the sensation of the patient. If it becomes too great, the patient may be immediately relieved by breaking the current.

By making an examination of the vagina during such a treatment, the internal electrode having been placed in the rectum, he found that, first, there was hyperemia, followed by anemia, and then by cyanosis of the vaginal mucous membrane. There was a considerable discharge from the uterus at the same time. He noted the same changes in the mucosa of the bladder when the internal electrode was placed within the vagina.

The temperature in the bladder is raised to 41° C. within ten minutes if one and one-half ampères of current are used, and to 40° C. in fifteen minutes if one ampère of current is used. The rectal temperature was elevated to 39.3° C. in fifteen minutes with one ampère of current, and to 40° C. in eleven minutes with one and one-half ampères of current.

He believes the method is the best one for applying heat because its degree can be measured and controlled. It is indicated in all cases where hot douches and hot applications generally have been used in the past.

The X-ray Treatment of Myoma and of Persistent Uterine Hemorrhage. Gauss² reports the use of the x-rays in the treatment of myomas and uterine bleeding associated with a high grade of anemia, heart disease, or catarrhal conditions of the air passages. He reports 100 cases, 80 of which were myomas; 64.7 per cent. were absolutely cured, and 35.3 per cent. were partially cured. Some of the latter did not continue the treatment. Exposures were made every two weeks. A measured quantity of the rays was used. The skin was carefully protected.

¹ Monatschrift für Geburtshülfe und Gynäkologie, Band xxxi, p. 92.

² Zentralblatt für Gynäkologie, No. 46, p. 1498.

The use of the *x*-rays must be limited to patients who are nearing the menopause. This point has been insisted upon by several authors, and during the past year Reifferscheid¹ found that the use of the *x*-rays over a period of time caused a degeneration of most of the primordial follicles of the ovary in nearly all cases. The Graafian follicles also were diminished in number.

He concluded from his studies of the effects of the Röntgen rays on human and animal ovaries, that it was very injurious.

Affections of the Abdominal Wall. ABDOMINAL INSUFFICIENCY. Stow² declares that, by reason of the muscular and fascial developments of the abdominal wall, the various abdominal and pelvic viscera are enabled to functionate properly. If the anterior parietes are weakened by pregnancy or other conditions, various anatomical and pathological disturbances ensue. This abdominal insufficiency may be inherited, and be associated with an inherent weakness of the visceral supports. There is a flabbiness of the entire body, more or less backwardness of development, and nervous and neurasthenic symptoms.

The most frequent form of insufficiency is found after distention of the abdominal wall by a relatively permanent high intra-abdominal tension. In this class we find ascites, chronic intestinal tympanites, tumors, and pregnancy the most common exciting causes. Hydramnion, multiple pregnancy, and various pelvic formations which prevent the engagement of the fetal head, and deformities of the spinal column diminishing the distance between the ensiform and the pubes, increase the overdistention.

The use of corsets unduly lowers the vitality and strength of the abdominal muscles, and this is a predisposing cause of insufficiency. The author notes the fact that if a woman who suffers from abdominal insufficiency becomes pregnant, she is relieved of many of her neurasthenic complaints when the intra-abdominal pressure is raised sufficiently by the growing uterus. During pregnancy, the steadily increasing pressure of the uterus lowers the elasticity of the abdominal wall, and when pregnancies occur in rapid succession, the stretching of the muscular supports is associated with atrophy. The fascia between the rectus muscle stretches, and diastasis occurs. The author says that the effect of pressure on the lateral abdominal walls is often observed during laparotomy for abdominal tumor. If the tumor is large and of long standing, the recti and the iliocostal margin of the quadratus lumborum stand out prominently, while the intervening tissues are lax and sagging. If the tumor is of smaller size, the lateral walls are thicker and the longitudinal muscles are more difficult to palpate.

This condition may be elicited also in the multiparous woman who

¹ Zentralblatt für Gynäkologie, vol. xxxiv, No. 18, p. 593.

² Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 269.

has borne children rapidly. At the seventh or the eighth month of pregnancy, if the woman lies down and then tries to raise herself to a sitting position, the recti become strikingly prominent and the posterior muscles more or less rigid, while the lateral walls are found to be relaxed and yielding. Beyond this test, one must depend upon the degree of stretching of the linea alba, and the extent of the diastasis present to determine the presence of abdominal insufficiency. In the milder form the muscles lose some tone, but there is no change in their structure. They are simply overstretched. The patients may complain of fatigue, pains in the lateral, anterior, or posterior muscles within a few hours of delivery. The muscles are tender on pressure. The diastasis is not marked and *the recti do not stand out prominently* when brought into action. So long as the patient is in bed, there is no distress. If suitable care is taken, the muscles will regain their tone and the diastasis will close. If the patient leaves her bed too soon and increases intra-abdominal pressure by lifting, etc., the condition becomes more or less permanent. In the severer form of abdominal relaxation, there is pressure atrophy of the lateral muscles. Some of the muscular bundles are separated from each other, and many of the fasciculi and fibrils are torn across. Because of the tension, the blood supply to the tissues is deficient, and many fibers atrophy, leaving only their sheaths and connective-tissue bands. When the latter are overstretched the relaxation becomes permanent. In this condition, the recti muscles are widened and flattened. They respond quickly to the electric current and contract in a normal manner, rising up *from the relaxed lateral walls*. The linea alba is stretched and bulges beyond the level of the recti.

Such a form of relaxation is more common in a multiparous woman. So long as she lies in bed there is but little suffering, but when she leaves it she suffers at once from gastric symptoms, pressure, and bearing-down sensations in the lower abdomen, and from meteorism. Upon standing in the erect position, the peristaltic movements of the intestines may be seen through the linea alba. These symptoms are increased if the mesentery is fat or the abdomen is markedly pendulous and overhangs the pubes.

The author favors *prophylactic treatment*, which should be started in childhood, and consists of exercises to develop the muscular system in general, the avoidance of corsets, etc. After labor, if there is any atrophy of the lateral walls or separation of the recti, a binder should be used. In those women who are predisposed to abdominal insufficiency, active exercise should be started early in the puerperium; later in those who have suffered from lacerations, sepsis, postpartum hemorrhage, or other serious accidents. The author, in selected cases, directs the patient to perform the following movements, beginning on the third day of the puerperium:

The patient, lying on the back, flexes the right thigh upon the abdomen,

keeping the leg flexed. The movement is slow and is repeated from fifteen to twenty times. The left leg is exercised in a similar manner. Finally, both legs are exercised together. This movement is intended to bring the rectus muscles into action.

Lying supine, the patient flexes the thigh upon the abdomen, keeping the leg extended. The movement is repeated with the other leg, and then with both together.

In the supine position the patient adducts and abducts both limbs alternately. She lies in the middle of the bed and aims to touch the lateral edges of the mattress with each foot. This movement brings the lateral abdominal and perineal muscles into activity.

The patient, resting on the shoulders, elbows, and heels, attempts to raise the abdomen and pelvis free from the bed. These four movements may be practised during the first week and should be continued intermittently during the puerperium. They are especially indicated in primiparæ whose walls fail to unite after delivery.

In women suffering from the second degree of relaxation, in whom the recti stand out prominently from the lateral muscles, or in whom the muscles as a whole are relaxed, additional exercises are recommended.

While lying on the back the patient raises herself on one elbow and partially turns or twists the chest to one side as if preparing to eat from a tray. The exercise is made slowly and the patient rests for a time on the elbow before returning to the dorsal position. The exercise is then repeated on the other side. This movement has the advantage of not interfering with a sutured perineum.

The patient, from a supine, raises herself into a sitting position. She then returns to her former position. The patient lies on the abdomen and attempts to raise the lower limbs and head free from the bed. This exercise is omitted if the breasts are tender or large. It is a powerful stimulant to the dorsal muscles.

The patient, lying on the back, grasps the head of the bed with both hands and attempts to raise both lower limbs until the feet touch the head of the bed. This exercise is reserved for the third week. It is the most fatiguing movement of the group and is generally not required.

These movements are performed both morning and evening for a period of from fifteen to twenty-five minutes, but never to a point of exhaustion or fatigue. No binder should be worn during the time the exercise is taken.

Colley¹ calls attention to the form of *relative hernia* which he says is *analogous to diastasis of the rectus muscles*. It is manifested by the increase in distance and a protrusion between the umbilicus and the anterior superior spine of the ilium due to the transverse stretching of the fascia of the external oblique. It may be unilateral or bilateral,

¹ Surgery, Gynecology, and Obstetrics, vol. x, p. 90.

and when bilateral, it may be classed under the head of pendulous belly, dwelt upon by Webster and others, but anatomically different in that it is external to the recti muscles. He describes an operation which he has devised for this condition as follows:

First, split the fascia of the external oblique parallel to the fibers in such a manner as to converge with a like split on the opposite side at a point just above the symphysis; secondly, separate the fascia from the internal oblique; thirdly, draw one layer of the fascia under the other with quilt sutures of linen, taking care to have the loop of thread include the fibers of fascia in a transverse direction; fourth, suture the remaining free edge of the fascia to the outer surface of the other layer with a continuous catgut suture to further improve the apposition at the free edge.

Thus the distance between the umbilicus and the anterior superior spinous process is diminished, the protrusion is reduced, and the fascial wall is doubled. The result is an abdominal supporter made of the patient's own tissues, and it may, therefore, be termed an autoplasmic bandage. Two cases treated by this method, one unilateral and one bilateral, have been entirely successful. The one was performed eighteen months ago, and the other, eight months ago.

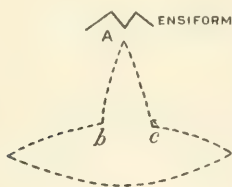


FIG. 50

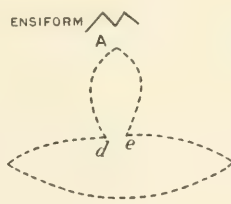


FIG. 51

The Treatment of Pendulous Abdominal Walls. Stolz,¹ who has been practising resection of the skin and fat of pendulous abdominal walls, gives a point in technique which it may be worth while to mention. In addition to transverse incisions, following the upper and lower limits of the overhanging fat, he makes a longitudinal or median excision of the fat, and advises that the outlines of the latter should be a little convex, in order to facilitate closure of the incision without tension.

Instead of the lines *a b* and *a c*, follow *a d* and *a e*.

By this method the lower ends of the longitudinal incision more nearly approach the median line, and the skin surfaces can be united without much tension. He drains the lower incision at the outer angle on each side (Figs. 50 and 51).

¹ Zentralblatt für Gynäkologie, vol. xxxiv, No. 7, p. 229.

New Operation for Umbilical Hernia in Bad Cases. Kelly¹ has devised a new plan for the treatment of umbilical hernia. It is founded on the overlapping operation of the Mayos. Sometimes, Kelly says, on account of the accumulated fat in the abdomen, the tension is considerable, and in bad cases, this sometimes leads to a relapse. For this reason, in most of the subsequent cases he has adopted a more radical plan of procedure which is still based on the fundamental idea of the originators, and that is to make an incision from the right and left margins of the hernial opening all the way across and through the strong fibrous sheaths of the recti, and then to detach and raise the sheath from the recti above and below for 2 or 3 cm. The hernial sac is then freed from the rest of the tissue. It is opened, and any adherent omentum present is removed. If the intestines are adherent, they are carefully dissected free and replaced in the abdominal cavity. The peritoneum is next sewed together with catgut. He next hauls up and sews the free margin of the lower under the upper flap from side to side with four to six interrupted silk sutures, using, if needs be, catgut between them. If the transrectal incision is angled a little upward and the overlapping of the recti is well done, there may be little tension; there is always a greatly diminished tension in the overlapping at the ring itself.

The free overhanging margin of the upper flap is now sewed by a continuous catgut suture to the fibrous tissues, and the supporting part of the operation is completed. He believes this form of closure to be a more efficient one than any yet devised. It introduces a new principle in the strong hauling of the tissue upward, starting well out on the sides, which aids in the overlapping of the tissues at the hernial opening. He always uses from four to six buried, strong silk sutures as a permanent support to hold the lower flap snugly up under the upper one; all the rest of the suturing is done with catgut. He believes it will be found that this more aggressive operation, while free from any added risk to life, is still more effective than any as yet practised. The method has been employed in 7 cases, in 5 of which it was combined with the resection of extensive amounts of fat.

Local Anesthesia. Kraatz² reports his experience with local anesthesia in dilatation of the cervix and minor operations. He uses a mixture made by dissolving 0.125 gram novocain and 0.00016 gram suprarenin in 25 c.c. of normal saline solution. The solution is freshly prepared, and is injected into the cervical tissues in all directions, as well as into the cervical canal. After waiting for five minutes, the operation may proceed. He has employed the method with success in 60 cases.

SCOPOLAMIN AND MORPHINE PRELIMINARY TO GENERAL ANESTHESIA. Collins³ reports his experience with scopolamin and morphine as prelimi-

¹ Annals of Surgery, May, 1910, p. 694.

² Zentralblatt für Gynäkologie, vol. xxxiv, No. 22, p. 729.

³ Journal of the American Medical Association, March 26, 1910, p. 1051.

nary to general anesthesia in 1100 cases. He administered a combination of scopolamin, $\frac{1}{100}$ grain, and morphine, $\frac{1}{6}$ grain, in a freshly prepared solution. The hypodermic injection is given an hour and a half before the operation. Thereafter, neither relatives nor friends are permitted to see the patient. An exception may be made sometimes in the case of husband or wife, but imperative instructions are given that the patient should not be talked to or aroused.

All the necessary manipulations and handling of the patient in the preparation are completed before the hypodermic is administered. The room is darkened and everything kept quiet. The patient falls into a tranquil slumber. The patient is drowsy within thirty minutes after the hypodermic injection is given and loses all apprehension or fear regarding the operation. About twenty minutes before the operation a layer of damp cotton is placed over his eyes, and he is taken to the operating room and placed on the operating table. The preliminary cleansing of the skin over the site of the operation is done gently while the general anesthetic is being administered. The preparation and the anesthetization are usually completed about the same time, and the operation proceeds.

This plan was adopted for all patients from eight years up. If the patient's condition was good enough to justify an operation, it was good enough to permit of a morphine-scopolamine injection. The author first used chloroform as a general anesthetic, then ether, and finally, nitrous oxide.

He has had no deaths which could in any way be attributed to the preliminary injection. There were unpleasant symptoms in one case only. After hysterorrhaphy and appendicectomy there was a temporary suspension of respiration; the patient was revived by the usual methods and made a good recovery. The patient usually sleeps from three to five hours after the operation. There is less postoperative vomiting and the secretion of mucus is decidedly checked.

Vaccine Therapy. Hamilton¹ has treated 84 cases of *gonococcus vulvovaginitis* in out-patients by vaccines. The youngest of the patients was three weeks; the oldest, twelve and one-half years; the average age, five and one-tenth years. The opsonic index was not taken; the author does not think it necessary, and there does not seem to be any relation between the index and the vaginal discharge.

Three separate vaccines were used; first, vaccine prepared from a sixteen- to eighteen-hour blood-agar culture from male urethritis, prepared by Lamar's method; the strength of the emulsion was 100,000,000 bacteria to 1 Cc.; second, vaccine from a stock culture at the Presbyterian Hospital, prepared by Meakins; the strength of this emulsion also was 100,000,000 to 1 Cc.; third, stock vaccines of Parke, Davis

¹ American Journal of Obstetrics, vol. lxi, p. 837.

& Co., of a strength of 100,000,000 and 500,000,000 to 1 Cc. The autogenous vaccines were not used.

The injections were made with an ordinary glass hypodermic syringe into the gluteal muscles under strict asepsis, and using small quantities of the vaccines; sterile physiological salt solution was employed as a diluent. The smallest number of injections necessary for cure was four; the greatest, eighteen. As regards dosage, in a majority of cases, regardless of age (except under six months), the treatment was started by an injection of 50,000,000 every fifth day, increasing the dose 10,000,000 each time until five injections had been given and the dose had reached 90,000,000. The intervals were now made seven and ten days before another was given. At each subsequent visit, smears of the secretions were taken and examined by Gram's method. In most of the acute cases, six injections were sufficient for a complete cure. In cases of long standing, it was necessary to use an increased number of injections, bringing the dose up to 200,000,000.

No case was pronounced cured unless it was free from gonococci, by Gram's method, once weekly for four weeks and thereafter, upon two additional examinations, at intervals of two weeks. He has had 19 children return to the clinic after a period of three months following the final examination, and found no evidences of the infection present.

In a few cases, an extremely slight local reaction took place at the site of the injection, but in every case this subsided within twenty-four hours and was never sufficient to cause any pain or tenderness. No general constitutional disturbance occurred after any of the injections. No local treatment whatever was used, except bathing when excessive secretion was present. Sixteen of the 84 cases were of long standing and had been treated by other methods, especially by permanganate irrigations. Gonococci were found in all before giving the vaccine treatment.

The author has collected the cases of vulvovaginitis of gonococcus origin treated during the last three years at the Vanderbilt clinic, comparing the results of treatment by irrigations and by vaccines. There were 260 cases treated by irrigation, and 60 per cent. of these were cured. There were 84 cases treated by vaccines, and 90 per cent. of these were cured.

The average length of treatment by irrigation was ten months; by vaccine, less than two. Of the 48 cases to which the vaccines were given, 16 had been under the irrigation treatment for long periods; 3 of these cases were not benefited at all, 1 did not return, and 12 were cured. Some of the cases which did not respond to the treatment with one variety of vaccine, frequently did while on one of the other vaccines. In the cases which were not benefited, new strains were tried—increased dosage, less frequent dosage, and more frequent dosage were attempted, but with negative results. The 5 uncured cases were all over five years

of age, 2 of them being over nine years. Contrary to the findings of some other published results in young infants under one year of age, 3 cures were obtained by the vaccines, the youngest patient being three weeks old.

Williams, Cragin, Newell¹ have investigated the value of vaccine therapy in gynecological and obstetrical cases. As a result of studies, they conclude that opsonins undoubtedly play a part in the production of active immunity. On the other hand, the determination of the opsonic index is technically very difficult and is subject to such variations that it is not available as a diagnostic or prognostic guide, and even among trained bacteriologists there is considerable skepticism as to its practical value.

Immunization by means of vaccines is a well-established prophylactic measure against certain infectious diseases, notably typhoid, cholera, plague, and dysentery. Vaccine therapy is undoubtedly a valuable remedial agent in local infections due to other pathogenic bacteria, while there is considerable doubt as to its efficiency in acute general infections.

In *chronic gonorrheal arthritis* and *urethritis* it is a valuable adjunct to other treatment, and occasionally may lead to cure alone. It appears to be useless in the acute infections, while it is more efficient in the treatment of the *vulvovaginitis* of children than any other means, but even here it does not always result in cure.

In *infections of the urinary tract*, especially those due to the colon bacillus, it sometimes results in symptomatic cure, but rarely relieves the bacteriuria. The scanty reports concerning the *pyelitis* and the *pyelonephritis of pregnancy* indicate that vaccine therapy is no more efficient than the usual treatment by rest in bed and the administration of salol or urotropin, as in neither does the bacteriuria disappear until after the termination of pregnancy.

In certain cases of *endometritis* it appears to reinforce the curative influence of curettage. The reports concerning its use in pelvic inflammatory diseases are too scanty to justify conclusions, but it would seem that it may be of value in certain chronic postoperative cases with sluggish fistula formation.

As the ordinary localized puerperal infections, irrespective of the nature of the offending bacteria, tend to spontaneous cure, the field for vaccine therapy is practically limited to acute general infections, where it unfortunately appears to be of little value, and the most that can be said from the reports thus far available is that vaccines do no harm.

Further research in this direction is desirable, and definite conclusions can be drawn only after the observation of a large series of cases, with

¹ Transactions of American Gynecological Society, 1910, p. 181.

careful bacteriological diagnosis, in which every alternate patient is treated with autogenous vaccines, while the others are left alone, or, at most, subjected to such general treatment as is common to both series.

Cushing¹ has kept records since January, 1907, of over 50 cases in which he has used vaccines. The cases were treated directly or in consultation. Some of them were operative. He is convinced that he has seen life saved by the use of vaccines, and he is sure that convalescence has been promoted and shortened by them. He thinks they are of value in all cases of infection, indispensable in cases in which the natural forces fail to overcome the infection, and able to turn the prognosis from bad to good in many doubtful cases. They will not work miracles nor render unnecessary the use of other approved methods of treatment, and the application of general surgical principles. In order to obtain good results, skill, knowledge, and zeal, on the part of hospital assistants and internes, are requisite.

Postoperative Embolism. Veit² mentions the two theories which most widely obtain in regard to the etiology of postoperative embolism. If embolism were purely mechanical, keeping the patient in bed for a long time after operation would prevent its occurrence; if it were due to infection, aseptic surgery would end it; but it is a known fact that the frequency of embolism has not been materially lessened in the past four years. Embolism is particularly prone to occur after appendectomy, hemorrhoid operations, and the removal of fibroid tumors of the uterus. Fromme's statistics of 4000 cases show 25 which ended fatally. In most of the cases there was an elevation of temperature previous to the formation of the embolus, and in all an infected organ had been opened during the operation.

The author believes that there may be a predisposition on the part of the bloodvessel wall. In one of the 8 cases which occurred in his clinic he noted at the time of operation that the veins of the parametrium were already thrombosed. His point of prophylaxis is to ligate all vessels before the germ-laden area is invaded.

Postoperative Tetanus. Peterson³ reports a case of tetanus developing twelve days after celiotomy for shortening of the round ligaments. He attributed the infection to catgut, and feels sure that he was correct in doing so; just previous to the accident he had changed his method of preparing it. He believes that in order to guard absolutely against tetanus infection, the catgut must be taken from animals in perfect health and prepared under the most hygienic conditions. The elementary threads should be tested for the tetanus bacillus, and only those which pass inspection used.

The author, by reviewing the literature, has been able to find 70

¹ Transactions of the American Gynecological Society, 1910, p. 201.

² Zentralblatt für Gynäkologie, vol. xxxiv, No. 1, p. 1.

³ Journal of the American Medical Association, January 8, 1910, p. 108.

cases of postoperative tetanus since 1890. It has been difficult to recover the tetanus bacillus or its spores from the suspected gut, but mice inoculated with it may die of tetanus. The difficulties of adequate bacteriological examination of the suture material after the advent of the disease, have always been great. The wound may heal by primary union, and the catgut either be absorbed or difficult to get at. The tetanus bacillus is not a rapidly multiplying organism, and it is exceedingly difficult to isolate it after the infection has taken place. This applies to the bacilli and to the spores in the catgut, as well as to the same organisms in or about the wound. It has been proved that the tetanus bacillus and its spores are most difficult to kill, and that under certain circumstances they survive boiling for sixty minutes.

The initial symptoms of postoperative tetanus have appeared within ten days in from two-thirds to four-fifths of the cases. The onset of symptoms in the remaining cases varied from the eleventh to the twenty-second day after the operation. Of 150 cases collected from the literature, none showed symptoms of tetanus within two days of the operation, and the average period of incubation was about eight days. The shorter the incubation period the more virulent and active the disease.

Whenever possible, the point of entrance of the tetanus bacilli should be ascertained, and then disinfected and drained. This is often difficult. Antitetanic serum acts on the free toxins in the blood, but has no effect on the toxins after they have become fixed in the nerve cells. The best effect of the serum will be had when its administration is started at the first appearance of the symptoms. Chloretone may be used to control the muscular spasms and to do away with the muscular rigidity. It is harmless, and does not prevent elimination. Elimination, by means of free catharsis and the administration of salt solution, is of the utmost importance.

Postoperative Neuroses. McRae¹ declares that much of his practice is among relatives and lifetime friends, so that he has been able to follow up the postoperative condition of an unusually large proportion of his operative cases. He has been most decidedly impressed by the very serious neuroses which followed complete removal of the ovaries. He has seen many hopeless wrecks after such work.

With Polak, Barr, and Cokenower, all of whom practically condemn conservative surgery of the ovaries and tubes, he absolutely disagrees. His observation of several hundred complete operations done in hospital and private practice, and personal experience with 135 conservative operations, has satisfied him that the number of complete and satisfactory cures is larger following the conservative operations than the radical procedures.

His conservative operations in married women have been followed by

¹ Journal of the American Medical Association, December 24, 1910, p. 2215.

pregnancy and the safe delivery of healthy children in a fraction less than 16 per cent. Furthermore, by these conservative methods the artificial menopause has been prevented, and the natural characteristics of the woman have been preserved. They have retained their womanly traits and womanliness. They have been saved that feeling of being set apart from their kind which comes to most women upon whom radical operations have been done. Although it might be urged that he had been peculiarly unfortunate in having these poor creatures appeal to him so frequently for help, McRae's inquiries among general practitioners, gynecologists, and neurologists have confirmed his views. Almost without exception his own observations have been confirmed by the general practitioner, the female gynecologist who has large opportunities for intimate knowledge of these cases, and the neurologist to whom these miserable creatures are referred as a last resort, to eke out their remaining days in abject suffering, despondency, and disappointment.

There must always be a great difference between the results obtained in private practice among the better classes of people and the results obtained in large charity hospitals. A large percentage of these latter cases cannot be followed up, and their subsequent histories as to operations and pregnancies cannot be gathered with any degree of accuracy.

A New Hand Disinfectant. Konrad¹ reports the use of *chlormetakresol* as a rapid hand disinfectant. C. Fränkel found that a 4 per cent. solution of metakresol killed anthrax spores in eight hours. The report of this discovery was not acted upon until 1909, when Laubenheimer announced that metakresol, particularly chlormetakresol, had a destructive action on the pathogenic vegetable forms of microorganisms. The author, after carrying out a number of experiments, was led to the conclusion that a 1 per cent. solution of chlormetakresol, in a mixture of two parts of alcohol and one part of acetone, gave the best results.

In a number of operations he relied solely on the disinfecting properties of chlormetakresol in preparing the hands. No rubber gloves were worn. There were two perineorrhaphies, one anterior colporrhaphy, four curettements, and four explorations of the uterus for retained secundines. All convalesced afebrilly. Chlormetakresol is little changed by contact with albuminous material, and it acts best in a mixture of alcohol and acetone. It is a rapid disinfectant and will sterilize the hands in about three and one-half minutes.

The Influence of the Trendelenburg Position upon Urinary Excretion. Bovée² has recently studied 8 cases of ether anesthesia and 8 cases of chloroform anesthesia with reference to the influence which the Trendelenburg position exerts on the quantity of urine which is excreted during anesthesia.

¹ Archiv für Gynäkologie, vol. xci, No. 2, pp. 243 to 256.

² Transactions of the American Gynecological Society, 1910, p. 443.

He found that there was a decrease of 58 per cent. in the amount of urine during ether anesthesia, and of 82 per cent. during chloroform anesthesia. He says that this great decrease, clearly, is not even in a moderate degree due to the urine being retained in the renal pelvis, for the rate of flow after the patient was changed to a horizontal position was not at once greatly increased, although it was slightly increased in the ether cases and even a little more in the chloroform series. It did not reach a rate in excess of that of the period preceding the use of the Trendelenburg position for one and one-quarter hours.

The objection that the bladder was not satisfactorily drained by the catheter cannot be urged, inasmuch as the fluctuations were always gradual and never sudden, except when changing to or from the Trendelenburg position. If the renal function is greatly lessened by the Trendelenburg position, then the danger of it is at once appreciated. In the presence of renal insufficiency, or of cardiac and arterial lesions, it would seem that the use of the Trendelenburg position introduces a special element of danger, and that this is less marked with ether than with chloroform.

The Isolation of Uterine and Adnexal Stumps. Solms¹ believes that, in conservative operations for pelvic inflammatory disease, it is very desirable to cover all raw areas with peritoneum. He describes an operation in which the vesical fold of peritoneum is opened from one round ligament to the other, and then drawn over the sutured surface of the broad ligament, the uterine and the adnexal stumps.

This plan is quite unnecessary in a majority of cases, but in exceptional ones it might prove of considerable worth and should be borne in mind.

Appendicectomy as a Prophylactic Measure. Grasmück² reports a case in which he was obliged to do a secondary operation and found a diseased appendix which had been left at the first operation. As a result of this experience and other observations, he believes that the appendix should be examined during every laparotomy; that if it is absolutely healthy it need not be disturbed, but if it is abnormally long, or if it has come in contact with diseased organs, or if it contains fecal concretions, or if there are any adhesions whatever, it should be removed.

The Use of Sterile Oil in Abdominal Surgery. Wilkie³ has investigated the use of sterile oil in abdominal surgery. After much experimentation, he adopted sterile vaseline oil. This is an oily liquid which comes to the surface in the preparation of vaseline. It is really a liquid paraffin. It is absolutely neutral and remains unchanged after prolonged exposure to steam under high pressure.

Wilkie's investigations had to do with the use of oil in the treatment of peritoneal adhesions. Twelve cats and rabbits were used. The

¹ Zentralblatt für Gynäkologie, vol. xxxiv, No. 23, p. 766.

² Ibid., No. 24, p. 804.

³ Surgery, Gynecology, and Obstetrics, vol. x, p. 126.

animal's abdomen was first opened and a surface of the small intestine was scraped until bleeding points appeared; then the abdomen was closed. Upon reopening the animals, six weeks or two months later, he found adhesions, although never very extensive ones. The adhesions were broken up, leaving raw surfaces. In some of the animals oil was then smeared over the raw surfaces and the abdomen was closed; the controls were closed without oil. Four weeks later the animals were opened again; in those in which oil had been used the adhesions were decidedly less extensive and dense than in the controls. At the end of a month, all trace of oil had disappeared from the peritoneal cavity. From these experiments he concluded that sterile oil might be advantageously used for mopping over denuded surfaces in operations for peritoneal adhesions.

Wilkie further endeavored to determine whether the use of oil in cases of acute peritonitis would delay the absorption of bacteria. He carried out a series of twelve experiments. He induced peritonitis by means of the staphylococcus aureus, which, in rabbits, causes a purulent plastic type of peritonitis closely resembling that found in the human subject. The purest sterile olive oil was employed, and, except in 2 cases, was injected immediately before the introduction of the bacteria. He concluded from this series of experiments, that the introduction of oil to the peritoneal cavity in a case of generalized peritonitis with no adhesions, did not have any noteworthy beneficial action as regards the saving of life.

The next problem which Wilkie tried to solve was: Does the presence of oil in a peritoneal effusion interfere in any way with its absorption, and does it, in non-fatal cases, delay the process of recovery? He found by making films, at intervals of a few hours, from the peritoneal effusion in two rabbits having peritonitis, to one of which oil had been given, that the cellular reaction was not interfered with, and that the return to normal was but slightly delayed. Cultures were made from the heart's blood of all the fatal cases, and it was interesting to find that whereas a growth of staphylococcus was obtained on five occasions from the blood of the control animals which got no oil, on only one occasion was a similar growth obtained from the blood of the animals which had received an injection of oil. The author took this as another proof, that the fatal issue in cases of peritonitis is due to toxins and not to a septicemia, and he thinks it upsets somewhat the rationale of the use of oil in peritonitis.

Wilkie now endeavored to ascertain whether oil would prevent obstruction from recent plastic adhesions in cases of acute peritonitis. He observed that in many fatal cases of peritonitis, especially those following appendicitis, a common finding postmortem was great distention of the small bowel, especially the jejunum. Although this is usually regarded as a toxic paralysis, he was convinced that in many

cases a definite obstructive cause was present, *i. e.*, a binding together by recent plastic adhesions of neighboring coils of the small intestine or adhesions between the small intestine and the cecum, or the parietal peritoneum.

He carried out a number of experiments on rabbits, as follows: Laparotomy was performed, the appendix was removed, and the stump invaginated. The cecum and some inches of the ilium were then rubbed with a piece of dry, sterile gauze in order to produce an abrasion of the peritoneal coat. One or two loopfuls of emulsion of *Staphylococcus aureus* (from $\frac{1}{50}$ to $\frac{1}{20}$ of the lethal intraperitoneal dose) was then introduced into the peritoneal cavity, and the abdomen was closed. The same procedure was carried out on a second rabbit with this addition, that before closing the abdomen, some sterile vaseline oil was poured over the intestines. In all the experiments, the rabbits treated with oil did not die and never appeared very ill. When their abdomens were reopened later, there were light adhesions but no obstruction. Both rabbits in which oil was not used died from obstruction, the result of adhesions between the ileum and the neighboring small intestine.

From these results, the author thinks it is evident that recent plastic adhesions, even thirty-six hours old, are capable of causing complete intestinal obstruction, and that sterile oil applied over abraded peritoneal surfaces in cases of abdominal infection, is of great value in preventing obstruction from recent adhesions.

He also discusses the use of oil to favor drainage and intestinal peristalsis in cases of general peritonitis. He thinks that by pouring oil over the inflamed intestines, adhesions will be prevented from forming, and in that way a greater intra-abdominal area made accessible to drainage. He cites two cases in which this was tried, and in the first, although the patient died, at autopsy the intestines were found to be non-adherent and showed a thin covering film of oil. In the second case of ruptured appendix abscess, in which, at the operation, pus and fibrin were found covering the liver and under surface of the diaphragm, the patient recovered. It was noteworthy that she passed flatus a few hours after the operation and had none of the symptoms of intestinal paresis which one usually sees in such cases.

The Postoperative Application of Heat. Tracy¹ recommends an asbestos cradle containing incandescent electric lamps for applying heat to patients in shock, postoperative depression, or collapse, or for producing diaphoresis. For this purpose he uses a frame covered with asbestos supplied with six or eight sixteen-candle-power electric lamps, which extends from the shoulders to the feet of the patient. When the patient is returned from the operating room she is wrapped in a blanket, the apparatus is placed over the body, the ends covered with blankets to

¹ Journal of the American Medical Association, October 22, 1910, p. 1443.

retain the heat, and the light turned on. In a few minutes the surface of the body is warm, reaction takes place promptly, and in the large majority of cases, the necessity for hypodermic medication is eliminated.

After ten or fifteen minutes it is usually necessary to turn out one or more lamps, as the amount of heat is excessive and will cause profuse perspiration. The apparatus is used also in cases in which it is desirable to keep the skin moist, as in renal insufficiency. The appliance is simple, inexpensive, light, and easily moved about, and can be connected to any electric lamp fixture.

Early Rising after Laparotomy. Wells¹ records a series of cases of abdominal section in which he systematically practised and advocated early rising from bed. He describes his technique, in which a noteworthy point is that he avoids clamping tissue which is not to be removed. He ligates vessels before division in preference to securing them with clamps. He closes the abdominal incision in layers, and holds the abdominal dressings in place by a many-tailed bandage of adhesive plaster snugly applied. It should be tighter below than above, so as to take off all strain from the abdominal wall when the patient stands, and yet allow room for breathing.

For the first twenty-four hours, the patient is allowed to be turned on her side by the nurse. Sometimes on the first, and usually on the second or third postoperative day, she is lifted out of bed into a chair for a half hour, morning and afternoon. If the operation has been a simple one she is lifted on to a commode to pass urine from the very first, and thus the use of a catheter is avoided.

The time out of bed is gradually increased to an hour or more twice a day, and the patient is encouraged to take a few steps so that by the end of a week she is able to walk easily. Early rising encourages the patient, diminishes nausea, increases the appetite, promotes peristalsis, does away with a catheter, prevents loss of muscle tone, and lessens the tendency to later complications.

The *contraindications to early rising* which he observed, included shock and general weakness in which syncope might be occasioned by an upright position. When there had been much tension in bringing together the edges of the incision and when there was a septic temperature or evidences of wound infection, the patient was kept quiet.

The author says it is to be emphasized that getting the patients out of bed does not mean that they are to be out of bed all day, neither are they to be allowed to go to work in a week or two weeks, nor are they to be denied the benefit that comes from rest and good feeding; but it does mean that the little periods out of bed greatly help toward these desirable ends. Furthermore, when patients are sent home from the hospital early they are to be kept in bed most of the day for another

¹ Transactions of the American Gynecological Society, 1910, p. 450.

two weeks, or longer if any special reason exists. In a series of 172 cases, the author had 7 deaths. A very large majority of these patients were out of bed before the fifth day, and a majority of them were out of the hospital on the tenth day.

The Nervous Influence in Menstrual Disorders. A very interesting and instructive paper on the effect of nervous influences upon menstruation has been written by Novak.¹ He thinks that there are three factors to be considered in the physiology of normal menstruation. First, an underlying cause, as yet undetermined, to which is due its occurrence and periodicity; second, the characteristic vasomotor phenomena which affect the pelvic bloodvessels; and third, the histological modifications of the endometrium which correspond to the various phases of the menstrual cycle.

He speaks of the apparent dependence of menstruation on the presence of ovarian tissue. In former days, the influence of the ovary was said to be exerted through the medium of the nervous system. No satisfactory explanation has ever been given, however, of the exact way in which this nervous influence is exercised. The actual nerve connections between the uterus and the ovary have not seemed to be essential to the occurrence of menstruation from such experiments as those of Knauer, Marshall, and Jolly, in which menstruation persisted even after the ovaries had been removed and transplanted to a distant part of the body.

Such experiences add weight to the belief that the activity of the ovary is the result of chemical rather than nervous influences. The occurrence of menstruation depends upon an internal secretion which is produced by the ovary, called by Starling, a *hormone*. The activity of this hormone is manifested most conspicuously by vasomotor phenomena affecting the pelvic bloodvessels and producing the pelvic hyperemia characteristic of the menses.

In the light of recent discoveries concerning the various activities and interdependence of the organs which possess internal secretions, it is scarcely probable that pelvic hyperemia is the only function of the ovarian hormone or hormones, but it is certainly the most prominent, and the one most directly related with the menstrual process. Like other hormones, or chemical messengers, the hormone of the ovary is transported by the blood stream, and it is conceivable that its effect is produced either through the vasomotor centre in the brain, or, more probably, through the centres in the spinal cord. That the effect may not always be confined to the pelvic bloodvessels would seem to be indicated by the occasional occurrence of the phenomenon of vicarious menstruation, with its accompanying hyperemia affecting vascular areas perhaps far removed from the pelvis.

¹ American Journal of Obstetrics, 1910, vol. xlii, p. 601.

Whatever part the nervous system plays in producing the menstrual phenomena, it is quite apt to reflect the general condition as a whole and is bound with greater or less intimacy with other parts of the nervous mechanism and may be affected by exogenous influences. As an example of this, the author mentions amenorrhea as a symptom of anemia and tuberculosis, and thinks that, in such cases, the lack of menstrual flow may be presumed to be the result of an inhibitory effect of the tuberculous process upon the vasomotor centres through which the ovarian hormone produces the vascular phenomena of menstruation.

The effect of nervous influences upon the menstrual function is further illustrated by the frequent occurrence of amenorrhea, less commonly of menorrhagia, in connection with the various forms of insanity. This is explained by Krafft-Ebing as due to "disturbances of the vasomotor innervation," and by Church and Peterson to "profound changes in the general nervous system influencing the spinal centres for ovulation and menstruation." Even slight or only temporary improvement in the mental condition of such a patient is often characterized by a rapid restoration of the menstrual function to normal, thus precluding the possibility of the disturbance having been due to any organic change in the uterus.

Even more interesting and suggestive are the menstrual disturbances which are so frequently noted in connection with tumors of the brain, especially those in the region of the pituitary body. It seems to have been shown by Cushing and others, that a frequent manifestation of diminished secretion of the hypophysis cerebri, more especially of its anterior lobe, is a dystrophy of the genital organs, and, in women, the occurrence of amenorrhea. It is interesting to note that another prominent symptom of the same condition is the development of adiposity—interesting, because of the well-known frequency with which amenorrhea and obesity are associated clinically.

It is rather difficult to conceive that the condition of adiposity can be produced by the amenorrhea in itself, and so the question arises, Is the amenorrhea the result of the obesity or are both the results of a common underlying cause? While this question, in the present state of our knowledge, cannot be definitely answered, such observation as those just mentioned make it seem highly probable that the pituitary hormone or hormones are directly or indirectly concerned in this association of symptoms.

There is another fact which lends weight to this view. It is well known that the menopause, especially when prematurely induced through surgical means, is often characterized by a considerable deposition of adipose tissue, ostensibly as a result of the withdrawal from the system of the ovarian hormone. The fact that a similar increase in weight is seen in connection with a disturbance of the hypophyseal function, is highly suggestive of the close inter-relation existing between

these two bodies. As yet the observations along this line have been confined almost entirely to cases of profound disease of the hypophysis, especially tumor formation, but it is only natural to suppose that many menstrual disturbances are the result of less severe disease of the gland perhaps of only a functional disturbance which causes no intracranial symptoms whatsoever.

The analogy with the pathological physiology of the thyroid will readily suggest itself. Not only the pituitary body, but also a number of other organs which possess internal secretions are closely related with the functions of the generative organs as has been shown in a previous paper, and it is by no means a fanciful assumption that many of the numerous cases of menstrual disturbances of unknown origin are to be explained by alterations in the functions of these related organs. The problems involved in this broad question, it seems to Novak, offer perhaps the most alluring and profitable field for work in the physiology of the female reproductive organs, and their gradual evolution and ultimate solution will draw back the obscuring veil from many matters concerning which we are as yet entirely ignorant.

Spastic Dysmenorrhea. Gibbons,¹ in discussing dysmenorrhea, says that there is only one form, and that may be spoken of as "spastic." He does not believe that there is any real obstructive form; in other words, he believes that although the ordinary uterine sound might not pass through the cervical canal, a probe of smaller size invariably will. The author believes that the source of the pain lies in a spasm or a cramp of the uterus. The spasm may be tonic or clonic, and in the very severe cases the tonic contraction may bring about an actual collapse from the severity of the pain. As explanatory of these spasms, he does not believe that the obstructive theory holds. He calls attention to the fact that more than one-half of the cases of dysmenorrhea come on in nulliparous women after the period has been regularly and painlessly established, and argues that if it were due to stenosis it would have been painful from the beginning.

A fair estimate of the severity of the attack may be gained by asking the patient if she can fulfil her social or other duties during the time of menstruation. The author invariably ascertains if the patient can keep her engagements.

The pain may be in the back over the uterus or in the ovarian region, but Gibbons does not regard any confinement of symptoms as necessary. Generally speaking, he says the pain is pelvic.

The average amount of blood lost during menstruation is about 4 ounces, and if this is distributed over four days, it gives an average loss of one-third of a drop in every minute which will not be difficult to pass along any cervical canal. He quotes Kermanner, who says that it is

¹ British Medical Journal, March 19, 1910, p. 676.

nearer the truth and consonant with the opinions held by Lennander, to seek the source of dysmenorrhœic pains, not in the uterus, but in the pelvic tissues and in those divisions of it which are rich in nerves; as, for example, the sacro-uterine ligaments.

Tobler believes that the most important seat of the pain is just where the most extensive vascular and nervous plexuses are present—namely, in the subperitoneal connective tissue. Herman believes that dysmenorrhea exists because the centres in the spinal cord or in the sympathetic system which regulate the movements of the genital canal are imperfectly developed. Normally associated with contractions of the uterus is dilatation of the cervical canal. In dysmenorrhea, dilatation does not occur, and, as a consequence, the contractions are painful. The ultimate cause is a biochemical material circulating in the blood, acting upon a hyperesthetic mucous membrane and possibly also upon the nerve centres which regulate the genital canal. This substance is due to a faulty secretion of the ovary.

Periodic Intramenstrual Pain. Heaney¹ has written a paper upon periodic intramenstrual pain. As a basis for it, he has reviewed 66 cases, 3 of which he observed personally. The frequency of the condition is given by Rosner as 12 in 2350. The majority of the cases occurred between the ages of twenty-five and thirty-five years. The frequency was about equal in patients above and below these ages. The largest number of cases seemed to correspond to the period of greatest sexual activity.

There was a high percentage of sterility—about 33 per cent. The menstrual type in the cases varied. Most all the patients were regular; there were quite a number in which the flow was scanty. In a few, the intramenstrual pain began at puberty. In most of the others it occurred a considerable number of years afterward. The pain is quite characteristic. It appears any time midway between the menstrual periods, on or about the fourteenth day after the onset of the last menstruation. The pain is distinctly periodic and appears every month with as much regularity as menstruation itself. When once established, it is very exceptional to have it fail to appear unless there be amenorrhea, when it stops as a rule.

The pain usually begins on one side of the lower abdomen or groin, the left more often than the right; it is cramp-like, spasmodic, and intermittent, with periods of relative or complete recession. Radiation to the leg, the opposite side, or occasionally the groin is noted. The pains become more frequent and of longer duration and generally diffuse over all the lower abdomen, with tenderness on pressure. Rarely the pain is dull and aching, more often sharp, tearing, and lancinating. The suffering in milder cases is relieved by heat; in severe ones opiates are

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 361.

necessary. Usually the duration is two or three days; it may, however, last until near the next menstrual period. The time of greatest relief usually is just after menstruation. Purefoy mentions a case in which the patient had intermenstrual pain in the breasts and none in the abdomen. Sometimes the pain is associated with a colorless vaginal discharge.

All cases show some pathological alterations, and the author states that it has been difficult to separate the essential from the complicating lesions. Out of 29 cases which the author collected from the literature, laparotomy is recorded as having been done six times; in 5, a fibroid uterus was found, and in them all the ovaries were either sclerotic or had undergone cystic degeneration. Rosner, among 12 private patients, found only 1 with normal pelvic organs; the others had increased sensitiveness, or size of the ovary, or they were prolapsed. There was also a general increase in the uterine dimensions which he called "diffuse pathological hypertrophy."

To explain intramenstrual pain, various theories have been proposed. Drennan thinks the pain is due to the escape of a non-fertilized ovum being associated with expulsive efforts on the part of the uterus. Addin-sell ascribed the symptom to hydrops tubæ profluens, the pain occurring when the tube expels its contents. Küstner claims that the pain originates in endometritis. Croom thinks that the disturbance is the result of ovulation which is asynchronous with menstruation, and that the pain is due to the resistance met by the follicle in its effort to burst and release the ovum.

After relating these theories and others which have been proposed, and discussing the relation between menstruation and ovulation, the author says he believes that periodic intramenstrual pain is an insufficient or abortive attempt at menstruation, the pain being a form of dysmenorrhea, and the whole picture depending upon degenerative and sclerotic conditions in the ovaries and uterus.

Injection of Atropine for Spasmodic Dysmenorrhea. Drenkhahn¹ has had remarkable results in spasmodic forms of dysmenorrhea with the injection of 1 mg. of atropine dissolved in 1 Cc. of water into the cervical canal. A tampon soaked in 1 per cent. atropine may be sufficient. The author says he has been using this treatment for the past fifteen years and has very rarely seen the pain recur during the menstrual period in which the patient was injected.

The Use of the Uterine Stem in the Treatment of Certain Types of Dysmenorrhea and Sterility. Davenport² believes in the use of the uterine stem in the treatment of certain types of dysmenorrhea and sterility. He selects the cases carefully. The patient has usually suffered since puberty, and not infrequently the symptoms have gradually become

¹ Zentralblatt für Gynäkologie, vol. xlvii, p. 1531.

² Transactions of American Gynecological Society, 1910, p. 130.

more marked. Pain usually begins with the flow, grows more severe and intense, and reaches a maximum in from six to twelve hours. It lasts from twelve to twenty-four hours, and its subsidence is coincident with a free establishment of the flow. It varies in intensity from a dull ache to sharp paroxysms, usually in front, rarely in the back, and sometimes accompanied with nausea. Usually there are no clots.

Upon examination one finds a rather small uterus with some degree of ante flexion, a conical cervix, and a small external os. When a probe is passed it occasions sharp pain upon reaching the internal os. There is a relative narrowing of the canal at this point, as is shown by the fact that some force is usually required to introduce the small-sized sounds. In some cases the obstruction may be spasmodic, but in the majority of cases it is structural, a real stricture, with an increase of connective tissue, narrowing and much loss of flexibility in the canal. At the start of the menstrual flow, the flexion of the uterus and the relative narrowing of the canal causes obstruction. The uterus contracts in an effort to expel the retained fluid, and the contractions are painful. As the amount of blood increases, the pain becomes more severe, this stage lasting several hours. Meanwhile the uterus is gradually becoming softer, and the rigidity of the canal is lessening, so that after a while the pain ceases and the flow reaches its maximum. The essential feature of this form of dysmenorrhea, Davenport holds, is a sensitiveness of the internal os due to flexion or a narrowing, or both, and except in the first year after puberty, accompanied with a growth of connective tissue.

The problem of treating this kind of dysmenorrhea has been solved by the uterine stem. He uses a hard-rubber one, 2 to $2\frac{1}{4}$ inches in length, slightly curved, and having a flange perforated with four holes. Unless it is sewed fast, it will soon come out. He, therefore, after thoroughly dilating the canal, introduces the stem and fastens it to the cervix by four wire sutures. After a few days, during which the patient is kept in bed, she may resume her ordinary life, except as far as violent exercise is concerned. He leaves the stem in place from four to six weeks, in all cases over one menstrual period, the length of time varying with the amount of hardening of the tissues about the internal os.

The author has never had a case of pelvic inflammation following the use of the stem. Keeping the uterine canal patent and straight for a number of weeks, and the continuous pressure on the irritable, and tough narrow internal os, causes changes which are curative. Either they are relieved completely, or to such an extent that the patient is satisfied.

The Normal Menopause. Norris¹ has made an interesting study of the normal menopause. After an analysis of 200 cases, he concludes that menstruation being dependent upon an ovarian secretion, it is fair to assume that the menopause is due to a change in the ovary; this theory

¹ American Journal of Obstetrics, vol. lxi, p. 203.

is borne out by clinical facts, histological studies, and animal experimentation. The generally accepted statement that the menopause is established at forty-two to forty-five is incorrect, and forty-six to forty-nine is nearer the actual age in the Eastern United States. Among normal women, the age at which the menopause appears varies within wide limits, being influenced by many factors. The following conditions prolong the menstrual functions: Childbearing, marital relations, good nutrition and hygiene, city life, and education, while converse conditions tend to an earlier menopause.

Climate and race undoubtedly play a definite part in the age at which the menopause occurs, but they are probably of a secondary importance in the United States. Hereditary influence is, in many cases, a potent factor, in some families the menopause occurs early, in others late. In the majority of cases, the chief features of the menopause is not the cessation or diminution of bleeding but the neuroses. These frequently antedate any change in menstruation and may continue for six to eighteen months after the final cessation of bleeding. The actual bleeding, is, however, the barometer of health. Normally, the menopause is established without an increased loss of blood. When menorrhagia occurs, an examination is indicated. Metrorrhagia should *always* be viewed with suspicion. In about 90 per cent. of absolutely healthy women the menopause occurs normally, but among average women fully 30 per cent. present symptoms which call for a careful physical and gynecological examination. All women at the menopause should be under the observation of a physician. Care of the cases at this time will result in the menopause being established with less discomfort to the patient, and many malignant neoplasms of the uterus will be diagnosed earlier than would otherwise have been the case.

The Premature Menopause. Stark¹ has made a study of the premature menopause. He states that in the statistics collected by Mayer, Tilt, Cuy, De Boismont, Courty, and Peuch, in 70,000 cases, that the normal menopause occurred in one-half of the instances between forty-five and fifty years of age; between forty and forty-five years in one-quarter; between thirty-five and forty years in one-eighth, and between fifty and fifty-five, in one-eighth of the cases.

He has called premature only those cases in which menstruation ceased before the age of thirty. He reports 11 cases from Ladinski's service, and has collected 48 cases from the literature.

In discussing the cause of the condition, he refers to the ovary as probably being the most important factor; the changes in the uterus being secondary. Alterations in the ovarian parenchyma occur in the course of acute febrile diseases, as reported in cases of cholera, by Courty. The hyperplasia resulting from frequently repeated pregnancies may be

¹Surgery, Gynecology, and Obstetrics, vol. x, p. 38.

followed by cirrhosis and an early menopause, as in the case reported by Mayer, in which there were six full-term pregnancies in rapid succession, the menopause ensuing at the age of twenty-nine.

Other agencies, such as peritonitis, excessive involution during prolonged lactation, and psychical influences may directly affect the ovary. It seems to be positively established that fright or severe pain may interfere with the normal menstrual cycle, either permanently interrupting it, or modifying its periodicity temporarily or permanently. Heredity is given as an occasional cause of a premature menopause by Borner and others. Obesity was considered the cause and not the effect of an early menopause by Kisch, and Currier, who has given this subject considerable attention, states that, as a rule, a woman under thirty who becomes excessively fat usually suffers from amenorrhea or oligo-dysmenorrhea, and, in addition, is usually sterile.

The patients usually complain of sterility and amenorrhea. They exhibit an atrophy of the genitalia which is quite like that appearing at the normal menopause. The 11 cases which Stark reports occurred in a total of 3301 gynecological patients, a proportion of 1 in 300. The causes of early menopause, cited by other authors, such as fright, oöphoritis, tuberculosis, diabetes, cholera, severe anemia, and hyper-involution following superlactation, and rapidly recurring pregnancies did not figure in any of them. They were rather, from the outset, types of irregular and scanty menstruation in which the ovarian function wore itself out, so to speak, without impairing the health of the patient. Whether defective development of the generative organs played a part cannot be determined positively.

The Treatment of Menopausal Nervousness. Hill¹ has employed a preparation made from the *corpora lutea of the ovary* in 12 cases. They were patients of intelligence and reliability, varying in age between twenty-five and thirty-eight, cases on whom he had operated and from whom he was compelled to remove both ovaries. All the patients showed the most severe type of nervous symptoms. He gave the preparation in capsules, 5 grains at a dose three times a day, from one-half to one hour before meals.

The result of his experience was that the corpora lutea relieved the severe nervousness in every case completely. In only two cases was there entire cessation of flashes of heat. In a case suffering from insomnia which started after her operation more than a year previously which was unaffected by hypnotics, complete relief was experienced after using fifty 5-grain capsules. One case reported a notable increase in sexual desire, while in the remaining 11 no noticeable change was experienced. He does not speak of having effected a cure in any case, and says that in several instances, patients who had ceased to take the treatment were compelled to return to it.

¹ Surgery, Gynecology and Obstetrics, 1910, vol. xi, p. 587.

McDonald¹ has used *lutein extract* in the treatment of the premature menopause and scanty menstruation. He treated 10 cases of scanty menstruation. They were given 5 grains of the lutein extract three times daily before meals. Seven of the patients were benefited. The earlier the case was treated the more definite seemed to be the results. Menstruation in the 7 cases which improved, increased in amount and in duration of flow. Ten cases of surgical menopause were treated. One patient was made distinctly worse; 5 were not improved, and 4 reported some improvement. In the entire 10 cases, only 1 was absolutely definitely healed. Five were absolutely uninfluenced, and 3 were doubtful. The author thinks that it is the opinion of the majority of gynecologists, that a retention of the ovary after hysterectomy is ineffectual to control surgical menopause unless sufficient of the uterus remains to permit menstruation. He thinks that the internal secretion of the ovary is but one factor in the physiology of menstrual life.

Climacteric Hemorrhage. Goodall,² discussing the pathology of climacteric hemorrhage, says that to him it appears that while uterine contraction and retraction play an important part in the arrest of hemorrhage at labor and during menstruation, the thick muscular walls of the arteries must have the controlling influence. If we admit this, he says, then we must also admit that in chronic metritis where the arterial system is so loaded with elastic tissue, and the uterine muscle fibers so inhibited by non-contractile elements, the controlling influence of both these great factors will be partially or completely lost. It would be an impossibility to even guess at the relative importance of these two controlling factors, for no two cases need be alike; in this one the arterial system would be most at fault, in that one, the vessels less and the uterine musculature more culpable.

There is another important factor to be considered in a hemorrhage, and that is the ovarian function or the ovarian secretion. Goodall believes that the basal pathology of climacteric hemorrhages lies in the uterus, speaking broadly and not limiting the meaning to either the musculature or the vessels. In the milder cases, in which the loss of blood amounts only to an increase at menstruation, the uterus cannot control the amount of blood brought to it by the menstrual pelvic congestion when all the organs are so engorged with blood. In the graver cases of metrorrhagia, the uterine walls are so diseased that hemorrhage takes place quite independent of the menstrual pelvic congestion; that is, when the blood supply to the pelvis is at its minimum.

Many cases in the literature show that the hemorrhage from chronic metritis has been cured, in a certain percentage of cases, by ovariectomy. Cures are found in the milder cases, because here the exciting cause of

¹ Journal of the American Medical Association, July 16, 1910, p. 205.

² American Journal of Obstetrics, vol. lxi, p. 32.

the recurrent pelvic congestion is removed by oöphorectomy. When, however, hemorrhage occurs independent of the menstrual period, in other words, when there is metrorrhagia, the result of ovariectomy is not encouraging. Hence we may sum up in a few words that the part played by the ovaries in the production of the hemorrhages of chronic metritis is simply the marked exacerbations of the hemorrhage brought about by the pelvic congestion incident to menstruation. But the cause of the unnatural discharges of blood must be sought in the uterus.

What Part Do the Ovaries Play in the Production of Climacteric Hemorrhage? Kaji¹ notes the fact that for some time the endometrium was supposed to be at fault in certain cases of hemorrhage, but since the observations of Hitschman and Adler, many of the supposed alterations of the endometrium are recognized as being physiological. As far as the myometrium is concerned, it was at first thought that chronic metritis with its increase of connective tissue produced hemorrhage. This idea was exploited largely by Theilhaber. Kaji discusses principally the part which the ovaries play in producing hemorrhage. Attention was first called to this by Brennecke, who declared that the ovarian influences might result in an abnormal swelling and growth of the glands in the endometrium and thus cause hemorrhage.

The question naturally arises whether a perverted ovarian influence is accompanied, necessarily, with any anatomical change in the ovaries. Authors have differed on this point. Franz thought he found a pathological condition of the Graafian follicle, and before him, Gottschalk, Winternitz, and others had reported analogous alterations in the ovaries. Gottschalk spoke of cavernous degeneration, and Winternitz described a thickening of the ovarian capsule, hyperplasia of the connective tissue, atrophy of the primordial follicles, and thickening and degeneration of the vessel walls.

Veit does not believe that the ovaries in such cases are normal anatomically, and Kaji reports seven cases which have been studied to determine this question. Six cases were in old women near the menopause; the seventh was a young patient who had had hemorrhage since her menstrual flow began. There was no apparent cause in any case for the uterine bleeding; there were no tumors, no pregnancy, and no inflammatory diseases. Curettement had done no permanent good, and there were no diseases of the endometrium. In the six old women, vaginal hysterectomy was done with the removal of both ovaries. In the young woman, the right ovary was removed finally, because it had become enlarged and very tender.

The six extirpated uteri exhibited no uniformity in regard to size or consistency, or the histological appearance of their mucous membrane. The ovaries, however, without exception, showed alterations; cyst for-

¹ Monatschrift für Geburtshülfe und Gynäkologie, Band xxxii, Heft 4, p. 427.

mation, thickening of the albuginea, and alterations of the vessel walls were always found. Those cases were especially interesting in which there had been no gross change in the ovary.

As the result of his examination, Kaji believes that there is no doubt but that the menstrual flow and associated changes in the endometrium are caused by the functional activity of the ovary. It is, therefore, easy to understand, he says, that pathological hemorrhage might be a consequence of disturbed ovarian function. It is further apparent that this disturbance would apply chiefly to two periods of life; first, at the beginning when the function is being established, and second, at the end of menstruation when the function is ceasing.

Metropathia Hæmorrhagica. Pankow,¹ in a study of hemorrhagic uteri, did not find morphological changes in the ovary. He is of the opinion that the ovarian disturbance is functional. He thinks that some of the other glands having an internal secretion are involved also, whether their internal secretion acts with or against the ovarian secretion. The idea that it is a functional disturbance connected with the ovary is borne out by the fact that such hemorrhages occur most frequently at the beginning and at the end of menstrual life. Some cases, undoubtedly, are explained on psychopathic grounds. The term *chronic metritis* should be used only when there is an undoubted inflammation of the uterus. For those cases of hemorrhage with no anatomical change to account for it, he proposes the term *metropathia hæmorrhagica*. He modifies this term further by adding *idiopathica*, or *senilis*, or *atheromatosa*, or *juvenilis*, according to the conditions which obtain in the individual case.

A New Plan of Treating Serious Metrorrhagia. Pollosson² recommends a plan which he has tried for some time in the treatment of metrorrhagia. It consists of clamping the cervix with a pair of forceps and leaving them *in situ* for some time. In this way the uterine cavity is closed at the bottom and the blood accumulates within. The instrument should not only close the external os, but should press the two sides of the cervical canal together for some little distance above the os. If there is a thickening of the cervix, then application is difficult but seldom painful. In his experience, elevation of temperature, injury to the cervix, uterine colic, or reflux of blood through the tubes into the peritoneal cavity have not occurred. The checking of hemorrhage is almost instantaneous. He has used the method in 8 cases of myoma, 1 of carcinoma of the body of the uterus, 2 cases of chronic salpingo-oöphoritis, 1 case of bleeding from an undeterminable cause. In carrying out the treatment, the uterus must be pushed or drawn down. The instrument can be left in place from three hours to three days without injury. Usually twenty-four hours are sufficient.

¹ Zeitschrift für Geburtshülfe und Gynäkologie, vol. lxx, No. 2, p. 336.

² Zentral. f. Gyn. No. 32. vol. xxxiv, p. 1095.

The Treatment of Chronic Metritis. In the treatment of chronic inflammation of the uterus, Merkerttschiantz¹ has had an opportunity of using *Mammin-Poehl* in 24 cases. The age ranged from twenty to fifty years. Of 14 cases complaining of profuse menstruation, 11 were brought back to normal by the use of this remedy, and 3 were improved. Of 20 patients complaining of pain, 12 were cured by the use of *Mammin-Poehl*, 5 cases were improved, and 3 showed no improvement. A leucorrhœal discharge was present in 17 cases; it disappeared in 7, was decreased in 9, and unchanged in 1 case after the use of *Mammin-Poehl*. A thick yellowish discharge which was present in some cases, became white, and decreased in amount. He used the tablets in 0.5 grain doses, three tablets daily, and accompanied this treatment with hot douching and hot applications.

The Influence of Animal Extracts upon Uterine Contractions. Ott and Scott² have studied the action of animal extracts upon the uterus *in situ*. The experiments were made upon rabbits and cats. The animals received paraldehyde by the mouth, and ether by inhalation. Fifteen experiments were performed. The animals, after being anesthetized, were fastened upon a holder, and the lower abdomen was opened in the linea alba.

The head of the holder was elevated, and the pelvic cavity was filled with normal saline solution so that the uterus was bathed in it. The abdominal walls on either side of the median line were incised and then elevated by ligatures to a horizontal bar. This aided in the retention of the normal salt, the temperature of which was kept at that of the body by the frequent addition of hot solution. The uterus was attached by two threads to a myocardiographic lever which inscribed the uterine contractions and the respiratory movements upon a smoked drum.

The dried extracts were rubbed up with distilled water, filtered through cotton and injected through the jugular. The following results were obtained:

Infundibular lobe of hypophysis, 20 per cent extract, marked uterine contractions:

Brain, gr. $\frac{1}{2}$, marked uterine contractions of a pregnant uterus.

Mammary gland, gr. $\frac{1}{2}$, marked contractions of the parous uterus.

Spleen, gr. $\frac{1}{2}$ to 1, marked contraction of the virgin and the pregnant uterus.

Parathyroid, gr. 1, increased contraction of the parous uterus.

Iodothylin, gr. 2, marked contraction of the virgin and the pregnant uterus

Parotid, gr. 1, fair contraction of the pregnant uterus.

Pancreas, gr. 1, very marked contraction of the pregnant uterus.

Thymus, gr. $\frac{1}{4}$, some contraction in the pregnant uterus.

Prostate, gr. $\frac{1}{4}$, marked contraction in the pregnant uterus.

Spermin (Poehl), drops 10, some contraction in the pregnant uterus of the cat.

Ovary, gr. $\frac{1}{4}$, slight contraction of the virgin uterus.

Testicle, gr. $\frac{1}{4}$, slight contraction of the virgin uterus.

¹ Monatsschrift für Geburtshülfe und Gynäkologie, 1910, vol. xxxi.

² American Journal of Obstetrics, vol. lxi, p. 766.

Of the above-named agents, infundibulum, brain, mammary gland, spleen, parathyroid, prostate, pancreas, and iodothylin have the most marked activity upon the contraction of the uterus. Bell and others have used the infundibular extract in postpartum hemorrhage. It stopped the bleeding in from three to four minutes. It has also been used in placenta prævia with excellent results. The contractions of the human uterus by it are more prolonged than those produced by any other preparation not excluding the extremely active preparation of ergot. In two cases of Cesarean section, after a single injection, the uterus contracted like a bleached ball, and subsequently relaxed only to a moderate degree. The preparation used was a 20 per cent. extract, of which the dose was 1 Cc. given intramuscularly. It may be repeated in an hour.

The Relationship between Rectal and Pelvic Diseases. Brettauer¹ calls attention to the association of pelvic and rectal diseases. The disturbance in the rectal function from lacerations of the levator ani is well known. Posterior displacements of the uterus, when they are uncomplicated by inflammatory process, rarely interfere to a marked degree with the function of the bowel. When a movable retroflexion, however, is combined with a relaxed posterior vaginal wall and more or less descensus, a preëxisting slight constipation may easily become more pronounced and then demand operation.

In a quite extensive experience with fibroids of all sizes and position, he saw few cases in which defecation was directly inhibited by the pressure of the neoplasm on the rectum or the sigmoid. Ovarian cysts which develop between the layers of the broad ligaments, may cause more or less constipation by pressure on the bowel. In malignant growths of the generative organs, the extensive infiltration of the perirectal cellular tissue found in the advanced stages may often produce stricture and ulceration. Secondary deposits in the pouch of Douglas from primary carcinoma of the ovary, frequently cause rectal stricture. When one or both ovaries are prolapsed, painful defecation is not infrequently encountered.

The *intimate relation between the gastro-intestinal and the genital apparatus* is most strikingly shown in the presence of inflammatory conditions. The bowel is always involved, whether the process be acute and rapid in course, or chronic and protracted. When an inflammatory involvement of the perirectal tissue extends to the layers of the rectal wall there may be tenesmus and a mucous discharge from the bowel. In the retrogression and gradual absorption of a retrouterine exudate, the symptom which gives most discomfort to the patient is difficult and painful defecation. This disability very often continues long after all the local signs of an acute inflammatory process have disappeared,

¹ American Journal of Obstetrics, vol. lxi, p. 777.

and only the scars in the posterior parametrium remain in evidence. These scars consist of the shortened, slightly infiltrated, sacro-uterine ligaments, and differ very little from the ultimate residue of a chronic parametritis due to cervical catarrh, tears in the cervix, or sexual abuses.

Whatever the etiology, the scars are a common source of a most obstinate constipation. The poor women suffer untold agonies every time the rectum is evacuated, gradually growing to fear this function and becoming increasingly accustomed to delay it, so that in some instances they postpone defecation for days or even weeks. Such cases are by no means rare, and their seriousness can only be sufficiently appreciated when we meet the final result of these months or years of suffering in the person of "the true hysterical woman."

Tuttle,¹ discussing the relation between the diseases of the rectum and the pelvis, says that the anatomical propinquity of the parts would lead one *a priori* to anticipate a close relationship in their pathology. Traumatism, inflammations, nervous and vascular affections are apt to spread from one to the other.

Owing to the close *association of the nerve centres in the spinal cord*, every irritation of the rectum may have a reflex action upon the pelvic organs, causing disarrangement of their function and sympathetic pains. As instances, may be cited inability to urinate after rectal operations, menstrual irregularities in ulceration of the rectum, or amenorrhea in case of periodic hemorrhage from hemorrhoids. On the other hand, pelvic diseases may reflexly affect the rectum and the sigmoid; as examples of this, he cites hemorrhoidal congestion during menstruation, constipation in prolapse of the ovaries, etc.

Tuttle dwells especially upon pelvic and sacral pains, irregularity in function, inguinal or iliac tenderness, pain shooting down the legs, reflex pains, digestive disturbances, mental and nervous affections. He draws attention to the frequency with which backache and pelvic pain may be produced by congested hemorrhoids, a concealed fissure, ulceration of the rectum, and fecal impaction or fecal stasis in the sigmoid. Many times also, such pain may be due to a strain, inflammation, or rheumatism of the iliosacral joints.

Tuttle warns against overlooking a small *lesion of the rectum* in restoring the support of the pelvic floor and in operations for descensus or prolapse of the uterus. If this is not done, the patient may make an anatomical recovery but not be relieved of her pain. She may then consult another surgeon, who finds a small rectal lesion, and by a simple procedure relieves her. This looks bad for the first surgeon.

In regard to *reflex pains*, Tuttle declares he has relieved a pain in the thigh, constant headache and facial neuralgia, by the removal of hemor-

¹ American Journal of Obstetrics, vol. lxi, p. 784.

rhoids, or by the incision or the stretching of fissure. Pain shooting down the legs may be due to disease of the rectum, and it has been said by Hilton that such pains in the left leg are almost pathognomonic of rectal ulcers or fissures. In Tuttle's experience, this would apply equally to the right leg. Of course, it is not invariably true.

Irregularity in the rectal function may be influenced by any of the pelvic lesions which cause pressure, inflammation, or irritation of the bowel. The author refers especially to the *rectal disturbance associated with rectocele*.

The *functions of the generative organs* are affected in turn by rectal diseases. Micturition is disturbed by traumatism, acute inflammation, fissure, ulceration, and large tumors of the rectum. Menstruation is influenced by constipation, which may delay it; by diarrhea, which may hasten it; and by bleeding hemorrhoids, which may prevent it either by depletion or by a sort of vicarious action. All the other rectal conditions which cause discharge or hemorrhage, or make a profound impression on the nervous system, may influence menstruation.

Procreation may be hindered by a fecal stasis or impaction which presses upon the uterus from above and causes an acute flexion of the cervix. Pregnancy may be intercepted or aborted by diarrhea, or by straining at stool, the result of stricture, inflammation, ulceration, fissure, or obstruction of the rectum.

Parturition may be influenced by constipation, by proctoliths or other foreign bodies in the rectum, by inflammation of the rectum causing distress and reflex arrest of the labor pains when the head presses down upon it. Hypertrophy of the levator muscle may prevent the normal relaxation of the perineum, arresting the head, and being often the direct cause of laceration. It may be absolutely prevented by a large polyp, fibroid, or other tumor of the rectum.

Pain in the inguinal or the iliac region, and tenderness there, are frequently associated with inflammatory diseases or tumors of the sigmoid. Constriction of the bowel with fecal accumulation above may press upon the pelvic organs and produce symptoms falsely ascribed to displacement of the uterus. The influence of the absorption of putrid matter from the intestinal canal upon the nervous and the mental system is becoming more and more acknowledged. Hypochondria and melancholia may be nothing more than the result of such absorption. Our cities are full of tired, depressed, and melancholy women in whom the condition is primarily due to imperfect emptying of the bowel and to other rectal conditions.

The Surgical Attitude toward Obstinate Constipation. Clark¹ considers surgically, the congenital and developmental defects which lead to obstinate constipation.

¹ Journal of the American Medical Association, August 16, 1910, p. 449.

Probably no condition is more lightly viewed by physicians in general than constipation, possibly because it is so common, and possibly, also, because in many instances it is more or less easily set aside by a laxative. Unless, therefore, this symptom becomes so exaggerated as to suggest a possible obstruction, it is usually viewed with professional equanimity.

Of late years the gastro-intestinal tract has been found to be a prolific source of neurasthenic symptoms, and such radical enthusiasts as Metchnikoff would have us believe that the colon, because of these noxious emanations, is a worse than useless reservoir, and following this train of thought, Arbuthnott Lane advises the extirpation of this organ in chronic constipation and claims brilliant results from the operation. Between all radical negative and positive viewpoints of a theoretical nature there is usually a happy midway position; to ignore the colon as a source of trouble would be heresy, for it is self-evident that fecal stasis is a source of serious autointoxication.

On the other hand, as we better understand this question, the total excisions of the colon would appear too radical, for Cannon's work indicates beyond question that the large intestine has a very important function in the absorption of residual food products passed on from the small intestine. It is, therefore, not a temporary reservoir but a very important food receptacle from which much nutrition is abstracted.

Clark points out the comparative anatomy and physiology of the intestinal tract. The stomach actively participates in the mixing and digestion of certain portions of foods; the small intestine, beginning with the duodenum, further elaborates the process, and from that point on not only digestion but active absorption is taking place. The physical life of the animal, bird, or reptile, and the character of food which it ingests, appear to determine the morphology of the small and large intestines. Thus, as stated by Huntington, in such creatures as birds which make long flights, requiring not only sustained effort but incredible repetitions of dynamic explosions, the food must be rapidly absorbed, and there is no place for residual food from which slow abstraction of nutrition occurs.

For instance, the canvasback duck has relatively a very long small intestine and a very short colon, almost of a cloacal type. On the contrary, the ostrich, which is slower of movement and feeds on a more bulky food, has a very long colon. The wide variation in animals is noted in such birds of prey as, for instance, the eagle; the length of the colon as compared with the small intestine is only 1 to 68 or 70, while in the cassowary, a species of ostrich, it is 1 to 6, or practically more than ten times as long. In animals which have long resting periods with only occasional demands for great rapidity and sustained effort, the colon is usually very capacious, in some species becoming an enormous reservoir.

Huntington declares as the result of his splendid research in the

comparative physiology of the large intestine, that man occupies a midway position in colonic development. As man is omnivorous, so a good absorbing surface, represented by 17 to 18 feet of small intestine is necessary, and at the same time a capacious colon for the retention of residual food products is essential.

There are three phases in the alimentary digestion: first, a mixture of food with digestive juices; second, exposure of food to the absorbing mucous membranes; third, propulsion of the residue through the alimentary canal. The first of these takes place in the stomach and the duodenum; the second, in the small and a part of the large intestine. It usually requires twenty-four to thirty-six hours for food to pass from the stomach to the anus.

Treves and Martin conclude that formations of the large bowel which are responsible for chronic constipation are very often congenital in origin, becoming manifested either early in life or being deferred until later, when from habit, physical exhaustion, or accidents the full effect of the mechanical embarrassment is realized. Clark very forcibly declares, however, speaking of the *x-rays and the anatomical form of the bowel*, that in discussing the surgical treatment of such conditions one dare not be guided by alterations in the form of position of the intestine, but must be guided by the clinical symptoms.

He says that the gist of the whole matter is that neither the anatomical standard nor the *x-ray* picture is to serve as an index for an operation. Symptoms, indeed exaggerated symptoms, must be the guide. Further, one cannot approach the surgical treatment of these cases with such optimism as experience justifies in acute surgical lesions, for if we accept the view that many of the cases are of congenital origin, we have at best a defective machine to deal with, in which the dynamic power is seriously or hopelessly impaired and in which there will not be a healthful rebound, such as gives such gratifying results in acute surgical cases.

He believes that we are establishing well-defined surgical principles in some of these cases, and that from this hitherto hopeless medical flotsam and jetsam brilliant cases of surgical cure may be culled, and, further, that while a complete cure may not be effected, at least a sufficient relief may result from well-selected surgical procedures as to cause us to give these poor individuals closer study in the hope that we may afford them even partial relief.

In taking the history of such patients, great care must be observed. When the patient states that they suffer from constipation, the degree of this may be, or should be, estimated by the administration of laxatives. An individual in whom the regulation of diet or the administration of some simple laxative, even if necessary of constant repetition, cannot be said to be seriously affected. Such cases have no place in the surgical domain. On the contrary, when an individual must resort to powerful

purgatives and drastic enemata, and especially if there is associated tympany with painful peristalsis, he must be considered as suffering from some serious anatomical or pathological defect. The surgical measures to be considered are either excision of redundant intestine or suspension of the ptosed intestine.

The Relation between Pelvic and Gastric Diseases. Viertes¹ says that F. Kretschy first called attention to the differences noted in the gastric juice during menstruation. He had a patient with a gastric fistula in whom he noted a sudden diminution in acidity just before menstruation, and a marked slowing of digestion during menstruation. Fleischer confirmed Kretschy's findings, and P. Müller grouped under the term "*menstrual dyspepsia*," instances of cardialgia, etc., which he found principally in hysterical but otherwise normal women during menstruation.

Kehrer studied the *effect of pregnancy and puerperium on the gastric juice*. During pregnancy there was a subacidity, but during the puerperium the acidity increased until about the tenth or eleventh day, when it again was normal. He attributes the subacidity partly to a thinning and increased alkalinity of the blood, and a diminution in hemoglobin. Nervous influences also come into play. The gastric juice can be stimulated or diminished by the sight or the smell of food, the effect produced depending upon whether it causes a desire for or a repugnance to food.

Viertes reports 45 cases in which there were gastric symptoms combined with disease of the sexual organs. He used the Ewald-Boas test breakfast, removing the stomach contents in one hour. It was examined quantitatively for total acidity and for free hydrochloric acid. Lactic acid tests were made only when there was marked acidity. When free hydrochloric acid was absent, he examined for pepsinogen. The motor power of the stomach was tested, not by the salol capsule, but by giving a Leube test dinner; if after seven hours any food remained in the stomach, it was taken as evidence that the motor power was at fault. The position of the stomach was determined by inflation.

Theilhaber and Kehrer declare that gastric and pelvic diseases may arise at the same time and yet be entirely independent of each other. They may differ in their time of appearance and other respects even though the same cause obtains for both; for instance, gastropnoia and retroflexion or prolapse of the uterus. Gastric diseases may cause genital disturbances. In this group must be included diseases of the whole intestinal tract; for instance, chronic constipation producing passive congestion in the pelvis and predisposition to certain pelvic disorders.

Viertes found that the gastric disturbances which sometimes occur in conjunction with diseases of the genital tract are usually independent

¹ Monatsschrift für Geburtshilfe und Gynäkologie, vol. xxxii, No. 2, p. 128.

of the same, and mostly result from obstipation or gastropotosis. The relation of gastric symptoms to disease of the genital tract is either in a direct or indirect way. Indirectly, they may appear as a result of anemia or hysteria. When there appears to be a direct relationship, a reflex neurotic irritation, the gastric juice gives normal reactions, and there is no characteristic clinical picture.

Backache. Reynolds and Lovett¹ discuss certain forms of chronic backache which are spoken of as hysterical spine, neurasthenic spine, weak back, uterine backache, irritable spine, chronic lumbago, railroad spine, relaxation of the sacro-iliac joints. Although this symptom may be the result of many different causes, such as actual uterine, spinal, or sacro-iliac disease, the authors are inclined to believe that in very many cases the backache is due to a strain which is incurred by an undue effort to maintain body balance under the conditions of the individual physiology. This form of backache they call "static."

A consideration of the results of their physiological study led them to the conclusion that anteroposterior balance in the upright position is maintained by moderate tonicities of the posterior musculature exerted against a slightly anterior position of the centre of gravity. Reasoning from this led them to further experiments and observations, to be presently detailed, which seem to them to show that an important element in all static backache is to be found in back-strain, and that to assume that relaxation of the sacro-iliac joints accounts for the symptoms is neither necessary nor wholly satisfactory.

Their observations show that, in the erect position, the centre of gravity of the body lies in front of the ankle-joints, which are held from dorsal flexion in this position by the gastrocnemius muscles. The centre of gravity lies also in front of the knees, which are similarly held in position by the hamstring and the quadriceps extensor muscles. The centre of gravity lies also anterior to the sacro-iliac joints and to most of the vertebral joints.

It has been shown by many experiments that when the cadaver is stood erect and the legs and ankles are fixed (to prevent the cadaver from collapsing on the ground), the trunk falls forward from the hips. In the erect position the trunk is held extended on the legs by the combined and continued action of the posterior musculature, the chief factors here being the hamstrings, the glutei, and the erector spinae muscles.

If, however, for any reason the centre of gravity becomes displaced forward, the strain on the posterior musculature necessarily becomes increased throughout, because the vertical stress at each level is determined by the horizontal distance of that point from a perpendicular dropped from the centre of gravity, and, if this moves forward, the

¹ Journal of the American Medical Association, March 26, 1910, p. 1033.

strain increases in proportion to the increased horizontal distances. So, too, other things being equal, the points farthest away from this perpendicular suffer the greatest stress.

The authors have investigated principally the effect upon balance of the use of corsets and high-heeled shoes. In their influence on the antero-posterior position of the body, corsets may be divided into neutral, bad, and good. The great majority of corsets belong to the neutral class and produce no appreciable effect upon body balance. Bad corsets have the following characteristics: They are long behind (especially at the top) and short in front (especially at the bottom); they are cut to exert their greatest pressure at the waist, and at the top and bottom are capable of exerting pressure only against the wearer's back; they have strongly marked sacral curves, but are otherwise straight in the back, and are highly incurved at the waist in front.

Bad corsets uniformly move the centre of gravity back and effect an important alteration of posture, which, to the unaided eye, usually appears as a simple movement of the shoulders forward. This appearance, though very constant, is in fact an illusion. When the action of bad corsets was measured and recorded, it was proved that they really threw the shoulders slightly backward, but always much less than the hips, which were thrown far behind the normal, thus inclining the line of the back forward, and giving the illusion of forward shoulders.

Good corsets have the following characteristics: They are short behind (especially at the top), and relatively long in front (especially at the bottom); they fit the wearer tightly around the pelvis (especially in the space between the iliac crests and the trochanters), and decrease regularly in pressure to their upper edge, where they are very loose (especially behind); they are considerably incurved at the waist-line at the back and sides, but show no waist curve in front. The good corset invariably moves the centre of gravity back, and, in all the experiments of Reynolds and Lovett, they threw the shoulders back of the normal, but under their effect the hips never moved farther backward than did the shoulders, and sometimes less.

No one can doubt that the erect position is one of comparative ease to the posterior musculature, nor that the forward bent position would produce backache if long persisted in. The authors go into the question of the selection and manufacture of proper therapeutic corsets, the details of which will not be given here. Suffice it to say that the corset should fit very tightly between the trochanters and the iliac crests. This anchors the corset and in many figures prevents its riding up without the use of the objectionable front garter. It should merely fit the patient over the iliac crests and immediately above them, as tightness at this point is uncomfortable and makes the corset ride up. In the back, it should fit the hollow of the waist snugly, being hollowed in at the back, but not at the front, and above the

waist it should be left as loose as the patient will wear it. In the front it should be straight, without constriction at the waist.

To be properly applied, a corset must be laced in three sections—sacral, lumbar, and dorsal. Before it is put on, all the lacings must be widely loosened. The corset must then be settled into place as low as it can be worn, and clasped. The patient should then pass the hand inside and lift the abdomen into it, settling the front of the corset as low as possible. The lumbar lacing should be pulled comfortably snug. The sacral lacing should then be made as tight as can be borne, and if the corset is so made as to spare the iliac crests, and properly cut out for the thighs in front, very tight lacing around the solid pelvis is comfortable. The dorsal lacing should be left as loose as is comfortable. The clinical test of the corset is that it should be comfortable to the wearer.

The authors also take up the effect on balance of high-heeled shoes. They emphasize particularly that they are speaking of the effect of such shoes on balance and not on the foot. The heels varied from one and one-half to two and one-quarter inches in height. After a long series of experiments it became evident that high-heeled shoes tip the body back, as a whole, without making any appreciable change in the lumbar curve. The effect of high-heeled shoes and corsets combined on balance seems to be good. The models which were used always felt more comfortable if they wore a corset, provided they also wore high-heeled shoes, and the high-heeled shoes were especially prominent in the production of comfort in the case of bad corsets.

The authors draw the following deductions from their observations: The centre of gravity can be determined in the living, erect individual; this centre of gravity is so located in relation to the supporting structures that the erect position is maintained by the tonicity of the posterior musculature; forward displacement of the centre of gravity leads to increased demand on the posterior musculature to maintain the erect position.

In the position induced by what we have designated as the good corset, the strain on the posterior musculature is lessened by displacing the centre of gravity backward, and more especially by the fact that the shoulders are moved back at least as far as are the hips.

Though the bad corset also displaces the centre of gravity backward, the relief to the posterior musculature which would be expected from this is neutralized in the position which they induce, by the fact that the pelvis is moved much farther backward than the shoulders, thus inducing an inclined position of the back in which the weight of the trunk, considered by itself, is thrown so far forward as to place undue strain on the posterior musculature of the lumbar and pelvic regions.

In the position induced by the wearing of high-heeled shoes, without any other modifying apparatus, the strain on the posterior musculature

is relieved by motion of the centre of gravity backward, through movement of the body backward as a whole, chiefly from the ankle-joint.

The study of two forms of modifying apparatus applied to the subject at the same time, introduces so much complication of condition that conclusions therefrom must be drawn up with great caution. When high-heeled shoes are observed in conjunction with either form of corset, we conclude that the attitude characteristic of either form of corset is modified slightly toward the normal of the individual by the addition of high-heeled shoes, but the analysis of the effect so produced involves so complicated a mechanical study that the authors are not yet prepared to publish conclusions as to why this effect is produced.

The Influence of Traumatism in the Production of Pelvic Diseases. Harris,¹ after analyzing about 1000 cases of railway accidents under his supervision, concerning the influence of trauma in the production of diseases of the pelvic organs in women, concluded that miscarriage during the first four months of pregnancy readily occurs, often from comparatively slight injuries or even fright, but after the fifth, it very rarely occurs.

Such accidents as have been detailed above, very seldom, if ever, cause disease or displacement of the pelvic organs in women whose organs are normal and healthy at the time of the accident. Women with chronic pus tubes, or other pelvic inflammations, may have an acute exacerbation of their trouble excited by accidents producing general injuries.

Women with old lacerations, displacement, prolapse, etc., may have the symptoms resulting from such conditions temporarily aggravated by general injuries, and are often particularly prone, either consciously or unconsciously, to attribute all their troubles to such injuries, even though they have had little or nothing to do with them. Accidents producing general concussion of the body may cause a temporary irregularity in menstruation, usually increasing, but occasionally suspending it. Such functional derangement seldom lasts longer than three or four months.

Treatment of Gonorrhea by Isoform. Asch² had satisfactory results with isoform. He uses urethral bougies made of some indifferent base and containing from 5 to 20 per cent. of isoform. He has a bougie inserted into the urethra twice a day. The results have been particularly good in the urethrovaginal gonorrhea of children. In such cases, bougies are inserted into the urethra morning and evening, and a larger bougie into the vagina once in three or four days. For adults, he uses tampons of isoform, 5 per cent., gradually increasing to 10 per cent. The tampons are renewed every two or three days.

¹ Surgery, Gynecology, and Obstetrics, 1910, vol. xi, p. 124.

² Zentralblatt für Gynäkologie, vol. xxxiv, No. 12, p. 406.

For the cervix, he uses a 5 to 20 per cent. isoform paste. Isoform is better than iodoform or ichthyol because it is cleaner, will not stain the patient's clothing, and has no odor. The strength of the preparation should be gradually increased from 5 to 20 per cent. He has treated 125 cases according to this plan: 56 were cured after four weeks' treatment; 20 were cured after a longer period of time; no case was considered cured until negative slides had been obtained on several occasions after the patient had held the urine for from four to six hours.

Syphilis in Prostitutes. An editorial¹ reviews a paper of Dreyer and Meirowsky, who tested 100 registered prostitutes in Cologne by means of the Wassermann reaction. In 56 of the 100 women examined, there was a definite history of syphilis, but only 1 showed manifest lesions at the time. Among the 43 remaining who gave neither history nor clinical evidence of syphilis, no less than 32 gave a positive serum reaction for syphilis, while 45 of the 56 women known to be infected, reacted positively. From this it would seem that although a very small proportion of such women show active syphilitic lesions when examined, yet in reality, from 83 to 89 per cent. are, or have been, infected. Of the few women in this series who were not infected, none had registered for more than three years, and in all but 3, registration had occurred within a year. These observations, says the editor, emphasize the frequency of *lues ignorata*, which is known to be especially common in women, since in 32 of the 89 positive cases, no history of its manifestations could be obtained:

Urinary Symptoms from Ailments Outside of the Bladder. Stein² believes that a great number of ailments outside of the bladder may give symptoms which correspond to those of a real cystitis. This simulation of cystitis may be due to some pathological change or irritation of the nerve centre of the bladder wall, to a pathological change in the genital organs, or to general nervous or systemic disease. Contractions of the uterus brought on by chemical or mechanical stimulants will cause increased contraction of the bladder.

Sometimes the bladder wall is so irritated by chemical changes in the urine that typical cystitis symptoms arise. Patients with pelvic lesions very frequently have bladder trouble. In a series of 54 such patients, 55 per cent. made no reference to the bladder; one-third complained of urinary symptoms, although no real vesical disease was present. Pelvic tumors of almost any sort, anteposition, retroflexion, and retroversion, pelvic exudates and inflammatory masses, infiltrating cancers, all may cause urinary symptoms.

The so-called hysterical or irritable bladders usually may be explained upon an anatomical basis if they are carefully studied. A few, of course,

¹ Journal of the American Medical Association, January 15, 1910, p. 210.

² American Journal of Obstetrics, vol. lxi, p. 769.

are purely hysterical. Most cases depend upon some inflammatory process in the pelvis. Sometimes these changes consist of the chronic or atrophic parametritis, as described by Freund.

Reflex incontinence may be caused by various lesions of the external genitalia. Diseases of the nervous system may affect the bladder, the most frequent one being tabes. Compression myelitis, multiple sclerosis, tumors of the spine, cortical lesions of the brain, and those of the crossed pyramidal tracts may affect the bladder. One of the first symptoms of a tumor of the cord may be a frequent desire to urinate.

Webster¹ says also that in the exact determination of the diseased conditions of the urinary tract in the female, mistakes in diagnosis are of the commonest occurrence. He recites one case in which the patient was supposed to have a gonorrheal cystitis, and had been treated for such, and yet a thorough cystoscopic examination, etc., showed a tuberculosis of the right kidney and ureter. Another patient was treated symptomatically for painful urination, while the real cause back of it all, early locomotor ataxia, was overlooked.

The frequency of urination, and the bladder distress due to irritating urine in gout and rheumatism, may wrongly be attributed to cystitis. Not infrequently, neurotic women are treated for vesical disease when there is absolutely nothing wrong with the bladder. Cystitis may be diagnosed when minor affections of the urethra only exist; such as, for example, urethritis, fissure, caruncle, and inflammation of Skene's tubules.

Webster mentions two cases seen recently, which had been treated for cystitis with no effect for some time. In the first, by means of a cystoscopic examination, an abscess cavity in the broad ligament with a fistulous opening into the bladder was discovered; in the second, a fistulous communication between an infected silk ligature and the bladder was found.

The author calls attention to the frequency of urination as a symptom of uterine displacement, uterine tumors, and inflammatory swellings of the tubes and ovaries, adhesions, etc. Small fibroid tumors of the anterior uterine wall have frequently caused bladder irritability which has been mistaken for cystitis.

The author had seen three cases of early carcinoma of the bladder in which the disease was not recognized until he made a cystoscopic examination. In one case, the pain from a vesical carcinoma was referred to the rectum, and the coccyx was removed for supposed coccygodynia. Tuberculosis of the urinary tract is often permitted to develop unrecognized because its most evident symptoms are vesical. Ulcer of the bladder may be overlooked unless a cystoscopic examination is made and the case may be treated palliatively when the only treatment of

¹ Surgery, Gynecology, and Obstetrics, vol. x, p. 399.

any moment would evidently be the formation of a vesicovaginal fistula. The author believes there is widespread ignorance of the anatomical relations of the ureter, and that very few bear in mind that when the lower end is thickened and tender, it may be palpated easily through the vagina and the rectum. He thinks that painful affections of the right ureter are often diagnosed as appendicitis, and the appendix has been frequently removed as a result of this error.

A moderate right-sided hydronephrosis is a common cause of trouble in women, and, as pointed out by Kelly, it is very widely overlooked. It is usually associated with abnormal mobility of the kidney, and the symptoms it produces are very often referred to the gall-bladder, the stomach, the appendix, or to other structures.

Transurethral Operation for Vesical Calculus. Kelly¹ describes a transurethral operation through a Kelly cystoscope for a vesical calculus embedded in a diverticulum. He shows a number of instruments which have been especially devised for this purpose. One is a short needle on a long shank which is attached to a syringe, and by which a solution of cocaine may be injected into the operative area. He also used a long, narrow electrocautery knife. The operation for a vesical calculus inclosed within a diverticulum, may be divided into four steps: (1) Exposing the diverticulum through an opened speculum; (2) cutting the sides with an electrocautery so as to open the cul-de-sac; (3) extracting the calculus with forceps; (4) examining thoroughly the interior of the cavity through the cystoscope.

Operation for Defect in the Genitalia. Puppel² speaks of all the operations that have been done for defects of the female genital organs. He cites a case in his own practice of a woman, aged twenty-two years, who had no vagina, and who, wishing to marry, wanted an operation. On rectal examination during ether anesthesia, no uterus nor appendages were found; the patient was told that she would be sterile, but she still insisted on an operation. He did the operation according to Gersuny, and was fairly successful, although a rectovaginal fistula formed, which later closed. To prevent contraction, he had the patient wear a hard rubber plug, day and night at first, and then only at night. He also mentions a case of uterus didelphys, in which he did an abdominal operation, removed the septum, and sewed the two sides of the uterus together. The patient had an uneventful recovery, and now menstruates regularly.

The Diagnosis of Tubal Pregnancy. Crossen,³ after reviewing 36 cases simulating tubal pregnancy, notes the following: A gonorrheal pyosalpinx, which, after the acute symptoms, lies dormant and unsuspected for a long period, may suddenly give rise to an acute exacerbation

¹ Journal of the American Medical Association, May 14, 1910, p. 1606.

² Zentralblatt, No. 3, p. 72.

³ Journal of the American Medical Association, February 12, 1910, p. 519.

of pelvic symptoms which simulate a ruptured tubal pregnancy. Sometimes acute gonorrhea may extend so rapidly through the uterus to the tubes and peritoneum, that the first indication of its presence is an acute peritonitis. If this is associated with some irregularity in menstruation, tubal pregnancy may be suspected.

An early miscarriage, if associated with a tumor or followed by mild salpingitis, may very closely simulate tubal pregnancy. A pregnant uterus which is irregularly softened or displaced, or hyperesthetic, or associated with a tubal enlargement, may simulate tubal pregnancy. An unsuspected tumor in the pelvis may suddenly give rise to severe disturbance, and if there happen to be present also some of the symptoms of early pregnancy, a diagnosis of extrauterine is quite probable.

Ovarian hemorrhage, or tubal hemorrhage from other conditions, may so closely simulate extrauterine pregnancy as to be indistinguishable before operation, and even after operation there may be some doubt, until a microscope settles the question. Salpingitis, appendicitis, and perforations of the gastro-intestinal tract may rarely come on so suddenly and progress so rapidly as to suggest internal hemorrhage from extrauterine pregnancy.

The Relation between the Ovaries and Testicles, and the Hypophysis. Mayer¹ discusses the relationship between the ovaries and testicles and the hypophysis. Cornte, in 1899, found that during pregnancy, the hypophysis underwent hypertrophy. This was shown by autopsy in 6 cases. The observation was confirmed by Erdheim and Stumme. The hypertrophy is more or less limited to the anterior lobe. It disappears with the beginning of the puerperium. The hyperplasia may be sufficient to increase the weight of the hypophysis to three times the normal weight. The hypersecretion in pregnant women is evidenced by unusual enlargement of the hands and lips. It has been found that early castration is followed by a marked increase in the size of the hypophysis. The relationship between the hypophysis and the ovaries and testicles is shown by the first symptoms of acromegaly, menstrual disorders in the female, and impotence in the male.

Transplantation of the Ovaries. Higuchi² reviews the literature on the subject of transplantation of the ovaries, and quotes the differing opinions of a number of authorities. Morris transplanted the ovaries in three women, and in all 3 cases the results were positive. Menses began in from one to four months. In 1 case, pregnancy even resulted, but this was terminated by abortion at the third month. Menstruation continued for four years and then ceased.

Frank reimplanted the ovaries in 3 cases, and menstruation appeared regularly without pain. The first became pregnant and went to full

¹ Archiv für Gynäkologie, vol. xc, No. 3, p. 600

² Ibid., vol. xc, No. 1, p. 214.

term, the second aborted, and in the third there was a possibility of tubal pregnancy. Dudley sewed a piece of ovary into the fundus of the uterus, and saw the menses return. In 2 cases, Délagénère planted pieces of ovary into the tube, and in 1 case menstruation began and continued regularly.

Pankow, in 7 cases, removed the ovaries from their normal seat and buried them in the uterovesical fold; in one case he buried them in the thigh. In 6 cases, menstruation began in from three to six months. In 2 cases, menstruation stopped after eighteen months; in 1 case, the implanted ovary was removed three and one-quarter years after, and microscopic examination showed old and new corpora lutea.

The author himself carried out experiments on rabbits. In 5 cases, he simply changed the ovaries from one side to the other. After thirteen months, upon autopsy, he found that the ovarian structure was still maintained, although the transplanted ovaries were smaller than the normal ovary, and bands of fibrous tissue were seen running through them, taking their origin from the point of implantation. In four rabbits he transplanted the ovaries from one female to another, both being of the same species. The result was that after one year the ovaries had either completely or partially atrophied.

Sarcoma of the Ovary. Wermuth¹ declares that sarcoma of the ovary is very rare. Olshausen, in 1886, found 37 cases only reported in the literature. The author quotes the statistics of Pfannenstiel, Jungmann, Stauder, Billroth, Schröder, Olshausen, and Frommel, which show that in a large number of ovarian tumors, sarcoma was found in 3.87 per cent. Sarcoma of the ovary is most frequent at two periods of life—puberty and the climacterium. A majority retain the form of the ovary for a long time and show a smooth surface. If the sarcoma is primary, it is unilateral; secondary sarcomas are frequently bilateral. Round-cell sarcomas go rapidly and give metastasis early. Spindle-cell sarcoma grows more slowly and often reaches a large size without giving metastasis.

In addition to the usual symptoms of ovarian tumors, ascites occurs in 60 to 70 per cent. of the cases. There are also anomalies of menstruation, such as menorrhagia, amenorrhea, or the development of metrorrhagia during the menopause. It is a curious fact that in children of early years who suffer from this condition, there is enlargement of the breasts, marked growth of hair on the mons veneris, and beginning of genital bleeding even as early as from three to seven years.

¹ Zentralblatt für Geburtshülfe und Gynäkologie, vol. lxi, No. 1, p. 123.

DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE THYROID GLAND, NUTRITION, AND THE LYMPHATIC SYSTEM

BY ALFRED STENGEL, M.D.

THE BLOOD.

Pernicious Anemia. The subject of pernicious anemia has had a certain impetus added to it during the past year by the publication of a book by William Hunter,¹ of London. He reviews the history of *pernicious* or *cryptogenic*, or, as he terms it, *Addisonian anemia*, since its first observation by Combe in 1822, and its original description by Addison, in 1855. He shows the confusion that has arisen through the writings of other observers, chiefly Germans, among whom Biermer and Ehrlich were the most prominent.

According to Addison, and this is in accord with Combe's idea of the disease, it is "without any discoverable cause whatever . . . and without any organic lesion that could properly or reasonably be assigned as the cause of such serious consequences."

In 1871, Biermer placed the cryptogenic form of anemia in the general group of progressive pernicious anemias, in which he also included secondary anemias, in virtue of certain clinical and anatomical features in common. He called this idiopathic form the primary form of progressive pernicious anemia. In 1892, Ehrlich added the Biermer group of anemias to certain others, and designated them as megaloblastic, because of the fact that they all possess certain megaloblastic blood changes. From 1888 to 1900, Hunter studied the subject closely from histological, experimental, chemical, and clinical standpoints, and drew definite conclusions regarding the hemolytic nature, gastrointestinal site, toxic cause, probable infective origin, and specific nature of this anemia.

From 1900 to 1908, fresh observations were recorded by Hunter. "These related to (1) certain infective lesions (glossitic, gastric, and intestinal) present in Addisonian anemia; and (2) the important part played by a form of sepsis hitherto completely overlooked, namely,

¹ *Severest Anemias*, 1909, vol. i, Macmillan & Co.

that derived from the mouth—"Oral Sepsis" . . . as a great factor in causing lesions and catarrhal conditions of the stomach and intestines . . . favorable to the contraction of Addisonian anemia. (This sepsis is also itself the cause of a common form of anemia—"septic anemia," as the author has entitled it.) Not producible by this sepsis, and once it is contracted, persisting after complete removal of the "oral sepsis," he found a peculiar condition of glossitis of an infective nature accompanying Addisonian anemia, coming and going in the most persistent manner and always marked by increased hemolysis and by exacerbations of the anemia."

Hunter divides anemias into three well-characterized and definite groups: (1) Addisonian anemia—"a specific infective disease." (2) Septic anemias (infective anemias). (3) Non-infective anemias.

The typical mode of development of *Addisonian anemia* is a history of antecedent oral, gastric, or intestinal trouble which extends usually over many years, caused by, or associated with, sepsis, with or without some septic anemia. This oral, gastric, or intestinal trouble is not the specific infective cause of the disease, but, in most cases, prepares the soil for its growth or complicates the condition after it has taken root.

These antecedent symptoms are suddenly followed by a rapidly developing anemia which is out of all proportion to the actual extent or severity of the symptoms or lesions connected with the mouth, tongue, stomach, or intestine. The sudden development of the severest anemia, marked by hemolytic changes (urobilinuria, glossitis, etc.) denotes the introduction of a new factor, viz., the hemolytic infection. No portion of the mucosa of the alimentary tract, from the lips to the anus, is safe from it. One of its most easily recognizable sites is the tongue, where it occasions the glossitis mentioned above, presenting clinical and pathological features of a striking and distinctive character. Once the infection is contracted, the history is no longer merely one of oral, gastric, or intestinal trouble as it was before. There are always four groups of symptoms—anemic, glossitic and gastro-intestinal, hemolytic, febrile, and nervous. These do not bear a constant relationship to one another, as one group or more may predominate. The four groups are always to be found if carefully looked for.

The disease can be *diagnosed*, even in its early stages, with certainty *during life* by considering (1) its mode of onset, with special reference to the glossitic and hemolytic symptoms; (2) the degree of blood change, which in a few weeks or even days invariably follows these symptoms, and (3) the characteristic symptoms above mentioned; and *after death* by the no less characteristic changes due to hemolysis in the liver, bile, kidneys, and spleen.

The second of Hunter's classes embraces a number of anemias such as the *anemia due to worms*, to *mixed septic infections*, and to the *oral gastric and intestinal infection* referred to above, without the presence

of the specific infective agent. The severest form of this group of anemias is clinically and prognostically the most severe of all anemias, excluding Addisonian anemia, and often resembles it. The changes are, however, essentially aplastic rather than hyperplastic.

The third group is the *non-infective* class and includes chlorosis, the anemia of hemorrhage, and that due to all sorts of non-infective causes.

He describes in detail the hemolytic, glossitic, gastro-intestinal, and bone marrow lesions which characterize the disease, and ends with a plea for the abandonment of the term "pernicious" as inaccurate, unscientific, and disheartening to the patient who hears it applied to his case.

The fact that Hunter's views have not received very wide acceptance speaks neither for nor against their soundness, for no mention has been made of any account being taken of the glossitis on which he so firmly insists. That he still has earnest opponents is proved by the views of those who have written on the subject during the past year.

In casting about for a name, Grawitz¹ would prefer "Addison's anemia" were it not for the fact that, of late, Hunter has claimed the term for a peculiar infectious disease of the entire digestive tract with a consecutive severe anemia. "Biermer's anemia" does not convey the meaning, because Biermer placed secondary anemias in this category. "Ehrlich's anemia," as a primary disease of the bone marrow, cannot be assumed to be a fact.

Grawitz is of the opinion that we have to understand under the term *pernicious anemia*, "such very grave forms of anemia as arise without any recognizable organic affection and without parasitic influence, as the result of a specific injury involving the red blood corpuscles." He thinks that the etiology can be cleared up only by clinical observations, and suggests the following causes:

1. Non-organic hemorrhages, such as chronic hemorrhoidal hemorrhages, or epistaxis, and not the organic hemorrhage of gastric ulcer or myoma.

2. Toxic substances, such as lead, arsenic, carbonic oxide and possibly the chronic use of morphine; also toxins of unknown nature.

3. Hygienic errors.

4. (Most important.) Intestinal intoxications, chiefly due to lack of hydrochloric acid in the stomach.

He claims to have proved this by the beneficial effects of a treatment in which he cuts down albumin by mouth, and prevents decomposition of the foodstuff. He uses a 1 per cent. solution of sodium arsenate, in increasing doses, after improvement has begun to manifest itself. Transfusions of blood are cautiously recommended, with the advice that the hemolysing and the agglutinating power of the blood be first tested.

¹ Medical Record, October 29, 1910.

SYMPTOMS. The symptoms of this disease with the characteristic blood picture has been described in previous issues of *PROGRESSIVE MEDICINE* so many times that repetition seems undesirable, so that only a few of the rather unusual points will be touched upon in the discussion of this phase of the subject.

As to general symptoms, Grawitz¹ is in accord with the great majority of authors. He does not agree with the view, however, that the most prominent feature of the blood picture is the macrocytosis. He quotes Schaumann, whose investigations in healthy blood show small cells 1 per cent., medium sized cells 66 per cent., and large cells 33 per cent; and in the blood of pernicious anemia, 17 per cent. small, 32 per cent. middle, and 51 per cent. large, as failing to prove this. The 18 per cent. increase in the large cells is practically balanced by the 16 per cent. increase in the small cells, and hence one is as much justified in calling this a microcytosis as a macrocytosis. Grawitz emphasizes the erythrodegenerative finding as the characteristic one.

He also fails to agree with most observers who claim that the hemoglobin is comparatively high as compared to the number of red cells. He thinks that the hemoglobinometer is too inaccurate an instrument, and that many of the microcytes are overlooked in making the count. He considers the unequal distribution of the hemoglobin among the red cells as a more important finding. He does not think that there is a specific blood finding in pernicious anemia, because all the same severe degenerative and regenerative types of blood formation are equally well found in other severe forms of anemia.

A case of unusual interest, because of its very marked blood changes, is that reported by Speidel.² He reports a case of *cryptogenic pernicious anemia*, in which the blood findings are those of a typical Addison's anemia, with a red cell count of 100,000 per c.mm. The count was made two hours before death. Every effort was made to secure a freely flowing drop, two counts were made and each was recounted; microcytes were especially looked for, and a fresh and recently filtered Hayem's solution was used. The hemoglobin was estimated (Sahli) at 9 per cent., leukocytes 2400, and color index 4.5. This is the lowest count yet recorded.

Croftan³ is of the opinion that, in the majority of the cases of pernicious anemia, gastro-intestinal disorders usher in the disease. He thinks that any secondary anemia can develop into a so-called primary pernicious anemia when regeneration ceases and degeneration sets in. This is a variable factor in each individual and introduces into the question an unknown quantity. The majority of the cases seen by

¹ Loc. cit.

² Boston Medical and Surgical Journal, October 27, 1910.

³ Journal of American Medical Association, August 13, 1910.

him presented the characteristics of an achylia gastrica, a hypochlorhydria, or an achlorhydria.

Parkinson¹ reports a case of *pernicious anemia with typical blood findings and achylia gastrica*. Under diet and treatment the patient improved. Six months after being first seen, he appeared with symptoms of sudden lapse. Urine was found to contain sugar varying from 5 per cent. to 7 per cent., together with acetone and diacetic acid. Death occurred two weeks after admission.

Moorhead² reports a typical case of pernicious anemia in which pigmentation of the buccal mucous membrane was a conspicuous symptom. "The lower lip on its inner aspect was of a bluish, inky color, and this discoloration was prolonged in the inner aspect of the mouth on both sides, principally on a level with the line of junction of the teeth, in the form of scattered inky patches. Similar patches less deep in color were also present on the inner aspect of the right cheek below the level of the teeth. The teeth, especially those in the upper jaw, were extremely foul with pus exuding from some of the sockets."

The blood count was as follows: erythrocytes, 480,000; color index, 1.5; leukocytes, 5000; poikilocytosis; anisocytosis; 2 megaloblasts in 500 leukocytes. Hydrochloric acid was absent from the stomach contents. Von Pirquet reaction was negative. It should be mentioned, though probably without any bearing on the case, that the patient had taken arsenic for one week.

Camac and Milne³ report two cases of *cord involvement in pernicious anemia* which well illustrate the two types of the disease. In one case, in which the anemia was the more severe, the posterior columns of the cord, particularly in the cervical region, showed patchy degeneration. The nervous symptoms were few in this case. In the other case, the nervous symptoms, particularly in the later stages, overshadowed the anemia. Here the cord showed extensive, though incomplete, degeneration with slight replacement gliosis in the posterior columns, and also a similarly irregular but more diffuse degeneration in the lateral tracts, which was more recent and less complete. The cord was involved from the mid-cervical to the lower dorsal region.

Morrell⁴ reports 6 cases of pernicious anemia with autopsies, and emphasizes the fact that in 5 of these there were either macroscopical or microscopical changes in the spinal cord, or both together. All the cases showed, at some time, clinical evidence of nervous involvement.

White⁵ reports a case of pernicious anemia with degeneration of the cord, chiefly confined to the posterior columns and lateral tracts of the dorsal and lumbar regions.

¹ Lancet, August 20, 1910. ² British Medical Journal, April 9, 1910, p. 865.

³ American Journal of the Medical Sciences, October, 1910.

⁴ Denver Medical Times and Utah Medical Journal, July, 1910.

⁵ British Medical Journal, June 11, 1910.

In a case of *splenomegaly* reported by Rudolph and Cole,¹ the blood-picture suggests pernicious anemia of the plastic type. Splenomegaly in pernicious anemia is unusual, but has been reported, and is thought to occur in about 1 per cent. of cases. The disease in this case, however, began at the age of eight years; it had lasted for twenty years with the patient in good health, and for the last fourteen years the patient had not needed medical advice.

The size of the spleen, together with the anemia and a normal differential leukocyte count, would suggest splenic anemia superficially, but the profoundness of the anemia and the fact that it was always of the pernicious type, with a high color index, would seem to exclude it. Other causes of splenomegaly were excluded also, and the authors think themselves justified in calling it a case of *pernicious anemia with splenomegaly*.

Although Hunter does not consider that cases of the aplastic type should be included in the term Addisonian anemia, they are generally regarded as coming under the heading of pernicious anemia.

Thomas² reports a case of fatal *aplastic anemia* with the following blood count: red blood corpuscles, 840,000; hemoglobin, 17 per cent.; color index, 1; white blood corpuscles, 12,000. The differential count was as follows: polymorphonuclears, 12 per cent.; small lymphocytes, 55 per cent.; large lymphocytes, 32 per cent.; eosinophiles, 0; mast cells, 0; myelocytes, 0.8 per cent. Three normoblasts were seen while counting 250 leukocytes. The erythrocytes were irregular in size.

The patient was aged thirty years, and suffered from a sore mouth from which the organisms characteristic of Vincent's angina were recovered. There were also numerous minute unidentified Gram-negative bacilli. The spleen was not palpable, the liver was somewhat enlarged. Some palpable glands in the neck were the only enlarged lymph nodes in the body. There were some purpuric spots on the back. No autopsy was permitted. The illness lasted from September to November, 1909.

Rolleston,³ referring to the same case, quotes the views of several authors. Cabot considers aplastic anemia to be closely allied to Addisonian or pernicious anemia, and states that the difference between the aplastic and metaplastic types is one of degree only. French regards it as a distinct form of grave anemia. Lazarus considers it as a form of simple anemia.

The aplastic form differs from the so-called metaplastic type of pernicious anemia in the absence of any signs of a compensatory reaction of the bone marrow. The red blood cells are diminished and also the granular leukocytes—polymorphonuclear, eosinophile, and mast cells—which are manufactured by the bone marrow. Nucleated red cells are

¹ American Journal of the Medical Sciences, October, 1910.

² British Medical Journal, January 1, 1910.

³ Ibid.

usually absent. There is a relative increase in the number of lymphocytes, in twelve of Cabot's cases the average being 72 per cent. This resembles lymphatic leukemia, and the condition of the gums in this case the beginning of the acute lymphatic leukemia. In Cabot's series, 75 per cent. occurred in patients under thirty-five years of age; more occurred in women than in men; the course was rapid and without remissions; there was great liability to hemorrhage, and a low color-index.

Carslaw and Dunn¹ report a case of pernicious anemia which they consider of the aplastic type. It concerns a male, aged twenty-four years, laborer, who was admitted to the Glasgow Western Infirmary, in July, 1909, complaining of weakness, "bloodlessness," and occasional swelling of the feet. He had lost strength rapidly, but had had no other symptoms. The previous medical history was negative.

There was decided pallor; the skin had a lemon-yellow tinge. Adipose tissue was present in good amount. The blood, upon first examination, showed a red count of 2,616,000, hemoglobin of 55 per cent., and color index of 1.05. No abnormality in size or shape, and no nucleated reds. He was put on iron and arsenic but declined steadily. There was no rise of temperature, no loss of weight, and no hemorrhages. The stools were repeatedly negative for parasitic ova. Subsequent blood examinations showed diminution in hemoglobin and red cells, with the color-index fairly high. A differential count of the leukocytes showed a lessening of the number of neutrophilic polymorphonuclears, with a large increase in the number of small lymphocytes and large hyalines (large mononuclears and transitionals). Myelocytes and myeloblasts were also present. There were only a very few nucleated red cells and slight poikilocytosis and polychromatophilia. The patient had no remissions, and died four months after admission.

Autopsy showed a markedly aplastic bone marrow with very small areas where regeneration was taking place. Very slight traces of iron were present in the liver.

A case, showing the liability to relapse and the uncertainty of obtaining a cure, is reported by Gioseffi.² A girl with profound anemia accompanied by a loud systolic murmur, with a history of acute articular rheumatism was treated by Mann³ with repeated injections of blood, according to Klemperer's method, and the result was published. The red cells had increased from 500,000 to 3,500,000, and the hemoglobin from 10 per cent. to 65 per cent.

Gioseffi saw her about two years later when she was admitted to the Infektionsspital, in Triest, as a suspicious case of pulmonary tuberculosis. A blood count at that time showed 300,000 red cells, and 10 per cent. hemoglobin. Autopsy showed mitral regurgitation, and no

¹ Glasgow Medical Journal, May, 1910.

² Münchener medizinische Wochenschrift, October 4, 1910.

³ Ibid., 1907, No. 36.

tuberculosis. Examination of the bone marrow suggested the aplastic type of pernicious anemia. This was in accord with the reduction of the number of the polynuclear cells in the blood smears. Gioseffi thinks that it was not an anemia secondary to articular rheumatism and mitral regurgitation, but a case of essential pernicious anemia of the aplastic type, with a remission and later a relapse. This point is still further emphasized by McPhedran,¹ who reports the case of a physician who showed typical symptoms of pernicious anemia in 1889. He was treated with Fowler's solution, and in six months he was able to resume practice. He remained well until 1906, or for seventeen years, when the symptoms returned. He continued to have remissions and periods of improvement for the next two years. He died in 1908 with the symptoms of marked pernicious anemia. This is, in all probability, the longest remission of which we have record.

Treatment.—Huber² remarks that no actual progress has been realized of late in the treatment of pernicious anemia. It is seldom recognized early enough for effectual treatment. In 4 cases he has experienced some benefit from the *transfusion* of small amounts of *defibrinated blood* into the gluteal muscle. He injects from 10 to 50 c.c. of blood at intervals over a period of about three months. In 1 case of severe pernicious anemia the red cells increased from 1,200,000 to 4,500,000, and the hemoglobin from 18 per cent. to 92 per cent. In ordinary anemia and chlorosis, he has also had good results. The hemoglobin of a young girl increased from 40 per cent. to 75 per cent., and the red cells from 3,200,000 to 4,800,000. It is the hemoglobin that laves out into the circulation, for the red cells can be demonstrated at the point of injection four or five days later. Arsenic should supplement this treatment.

Shultz³ notes the fact that transfusion of blood in cases of pernicious anemia produces only transient results.

Croftan⁴ suggests a plan of treatment that has been followed by progressive improvement in the cases treated, and justifies it by remarking that similar cases not so treated are dead or show no improvement. It consists in the *administration of the maximal amount of proteins*, with artificial measures to facilitate digestion and absorption; small amounts of alcohol each day; fats moderately; and vegetables, fruit, bread, etc., to make a palatable meal. The patient is fed frequently, and in small amounts. Strong, instead of dilute, hydrochloric acid is given in 10 to 15 drop doses in mucilage water after meals and thyroid extract in 3 to 5 grain doses three times a day, owing to the author's conviction that it helps in the assimilation of protein pabulum. He reports three

¹ American Journal of the Medical Sciences, August, 1910.

² Deutsche medizinische Wochenschrift, June 16, 1910.

³ Berlin. klinische Wochenschrift, August 1, 1910.

⁴ Journal of the American Medical Association, August 13, 1910, p. 593.

cases, with the blood picture of pernicious anemia, in all of whom symptomatic cure has been established, the elapsed time ranging from one to two years.

PERNICIOUS ANEMIA IN CHILDREN. In most text-books on the subject of the diseases of the blood the anemias of childhood are given a special place, due to the fact that anemic conditions are frequent in children, and that childhood is distinguished by diseases of the blood or blood-making organs, which do not occur in adults.

The anemia pseudoleukemia infantum of von Jaksch resembles the so-called Biermer's pernicious anemia, but can be distinguished from it hematologically by a frequently well-marked hyperleukocytosis. Common to both diseases is the return of the hematopoietic system to embryonal conditions. Nägeli thinks that the anemia pseudoleukemia infantum is a high-grade reaction of the erythroleukopoietic system, and shades off to many of the other anemias of childhood. The ease with which this system reacts to different influences is the reason why reports of cases of pernicious anemia in childhood are received with much suspicion.

Koch¹ refers to the paucity of the reports of cases of this disease occurring in children under two years of age, which are universally accepted as such. He reports the case of an infant which entered the Heidelberg hospital at the age of eight months. It was breast-fed for three months, and then was given barley water and milk. Six weeks before admission, a small ulcer appeared on the left hip, which soon healed up. This was followed by another small one on the chest, which had not yet healed at the time of admission. Before suppuration appeared on the hip, a high-grade progressive pallor had developed. The appetite became poor, and, later, diarrhea set in; 6 to 8 green, slimy stools were passed daily, with no blood or pus.

Physical examination showed a lemon-yellow color of the skin, and high-grade anemia of the mucous membranes. No jaundice, hemorrhages, or signs of rickets. Several small lymph nodes were palpable in the right axilla and freely movable. The spleen was not enlarged. The eye grounds showed high-grade anemia, but no hemorrhage.

The Blood.—Hemoglobin (Salhi), 25 per cent.; erythrocytes, 1,100,000; leukocytes, 6000. A stain (May-Grünwald) showed many poikilocytes, macrocytes, microcytes, normoblasts, and megaloblasts, the latter often of great size and with the nuclei showing chromatin threads very clearly. Differential count: mononuclear neutrophilic leukocytes, 2.1 per cent.; polynuclear neutrophilic leukocytes, 31.5 per cent.; eosinophilic leukocytes, 1.1 per cent.; large lymphocytes, 3.9 per cent.; small lymphocytes, 56.4 per cent.; transitionals, 1.9 per cent. The temperature later rose to 38.7°, the pulse to 160, and the

¹ Jahrbuch für Kinderheilkunde, vol. lxxi, No. 2.

heart action became irregular. Rales increased, but no areas of dulness could be determined. The hemoglobin sank to 19 per cent. with the red and white cells as before; one erythrocyte with basophilic granulation, many megaloblasts. The patient died on the tenth day after admission.

The autopsy showed confluent bronchopneumonic areas in both lungs, with beginning fibrinous pleuritis with punctiform subpleural hemorrhages. The heart muscle showed marked fatty degeneration. There was anemia of all the organs; hyperplasia of all the lymphoid structures (spleen, lymph nodes, solitary follicles); bone marrow free. Cultures from the heart blood on agar showed numerous colonies of staphylococcus albus and aureus. No bacteria were demonstrable in sections of the lung. Smears were taken from the bone marrow and stained with the triacid stain and May-Grünwald stain. They showed enormous numbers of megaloblasts, which seemed to overshadow the large number of normoblasts. Nuclei of the former often showed karyorrhexis. There was a great difference in the size of the non-nucleated red cells. Among the leukocytes were many eosinophiles and myelocytes. Non-granular cells (of the type of Nägeli's myeloblasts) were most numerous. There was a small number of neutrophilic myelocytes.

Histological examination showed that there was much blood pigment in the liver, lung, and spleen, and high-grade fatty infiltration of the liver and heart.

Koch bases his diagnosis of severe anemia on the clinical, autopsy, and histological findings, the anemia being combined with evidences of the production of blood-forming areas in the spleen, liver, and lymph nodes, showing their assumed hematopoietic functions.

The question arises as to whether the anemia can be classed under the progressively pernicious type, or whether it was secondary to some other disease. In childhood, the most likely causes are syphilis, rachitis, and disturbances of nutrition, all of which can be excluded. Koch considers sepsis, and rules it out because of the pallor which was present before the abscess had developed, and because of the appearance of the spleen, the absence of bacteria in smears of the bone marrow, and because sections of the organs failed to reveal a septic origin for the disease.

In considering the development of the hematogenetic areas in the spleen, liver, and lymph nodes, he agrees with Nägeli, and differs from Neumann, Ehrlich, and Grawitz, who believe that they are accidental collections of cells. In a number of autopsies on infants, he has found, in these areas, eosinophilic myelocytes when they were not demonstrable in the circulating blood, and he draws his conclusions largely from this fact. Furthermore, he found this accessory hematopoietic development in anemia secondary to a variety of conditions.

Chlorosis. Very little work of any importance has been done on chlorosis during the past year. Some few efforts have been made to explain its etiology, but nothing has been done to clear up our lack of knowledge on the subject.

ETIOLOGY. Morawitz¹ protests against the assumption that chlorosis is essentially an anemia. In twenty-eight girls with the classical picture of chlorosis whom he has examined in the last six months, the proportion of hemoglobin was above 80 per cent. in nearly all, not below 60 per cent. in any, and frequently over 90 per cent. Notwithstanding this normal, or nearly normal, composition of the blood, the patients presented the typical symptoms of chlorosis, and nearly all were cured by iron. He concludes, from this and other experiences of the kind, that the anemia is not the essential feature of the chlorosis, but only one among other symptoms. It is much more probable, he thinks, that defective or excessive functioning of the ovaries, or some interrelated ductless gland, is at the root of all the syndrome. The ovary alone cannot be responsible, as ovarian organotherapy has not given encouraging results. Giudiceandrea has recently reported enlargement of the thyroid gland in fully 50 per cent. of his chlorotic patients examined. The fact that chlorosis develops almost exclusively during puberty is suggestive in this line, as, also, that chlorosis may occur again and again in those who had it at puberty. Seiler found the hemoglobin percentage only 10 or 15 below normal in 51 cases of chlorosis, and all the symptoms disappeared under the administration of iron in 30 of the patients. He calls this condition "masked chlorosis." Among the 21 who were not cured by the iron were 12 girls with incipient, apical tuberculosis. The iron evidently acts on the primary cause of the trouble; it is absurd to suppose, Morawitz declares, that the mere loss and recovery of such a minute hemoglobin percentage as the difference between 80 and 90 per cent. could elicit and banish the train of symptoms we call chlorosis.

The occurrence of *chlorosis and tuberculosis in the same patients* has been noted by Zickgraf,² and more importance is attached to it by him than by other observers. He makes a practice of applying the tuberculin test in every case of persisting chlorosis, and states that a positive response was obtained in about 75 per cent. of 55 patients in which there was nothing otherwise to suggest the existence of tuberculosis. For him, this finding confirms the assumption that tuberculosis is responsible for chlorosis in a suprisingly large number of cases. The reaction was obtained with 5 mg., or less, in all but 5 of the patients. In 48 other patients, the chlorosis accompanied manifest signs of tuberculosis. In the tuberculous cases in which the chlorosis was the first, or one of the first manifestations of the infection, the patients reacted

¹ Münchener medizinische Wochenschrift, July 5, 1910, vol. lvii, No. 27.

² Fortschritte der Medizin, April 28, 1910, vol. xxviii, No. 17.

to the tuberculin test with smaller dosage and in larger percentage than the rest of the tuberculosis suspects, and the percentage of negative responses was less. Sanatorium treatment was indicated for only about 57 per cent. of the total number of suspects, while in nearly 71 per cent. of the whole number of chlorotics, with or without suspicion of existing tuberculous infection, was this form of treatment advised.

It has struck Welland¹ that a possible explanation of the origin of chlorosis might be that the kidneys may be functionally incapable of secreting urine containing more than a certain proportion of salts, such as is well known to be the case in chronic interstitial nephritis with resulting retention of salts and retention of fluids to keep the salts in solution.

Von Noorden² thinks that there is much to sustain the assumption that chlorosis is a special form of defective formation of blood, resulting from the fact that the physiological excitation proceeding from the female genital apparatus and acting on the nerve centres presiding over the production of blood, is abnormally weak. The genitals are frequently infantile in chlorosis, but may develop later so that the genital apparatus may be apparently normal after the age of thirty years, or the infantile state may persist. Out of 85 sterile women examined, 56 stated that they had had chlorosis during their girlhood. This proportion is too large for it to be a mere coincidence in all cases. The assumption that chlorosis is not a primary metabolic disturbance, but a neurosis, seems to be sustained by certain facts he cites indicating the direct mediation of the nervous system, as well as of the internal secretions and the blood in transmitting the stimulation from the ovaries to the bone marrow. He mentions that the sign of temporary eunuchoid conditions, sometimes observed in boys just before puberty, are generally found in families in which the girls present chlorosis. He has frequently encountered, in late years, a condition suggesting chlorosis in some points, and in others directly the opposite. Young girls previously entirely healthy, cease to menstruate after some acute infectious disease, they lose appetite and weight, and look old, while trophic disturbances are noted in the skin and fingers. In three such patients there was considerable scleroderma. The blood does not suggest chlorosis, but rather polycythemia. In one such case, there was pronounced scleroderma of the breast and arms, while the body of the uterus was palpably atrophic. The rapid and alarming emaciation, the inability to take sufficient nourishment, on account of diarrhea when more than a certain amount of food was taken, and other features of this condition are so marked and so uniform that he regards the syndrome as a typical affection which might appropriately be termed "genitosclerodermic degeneracy." Further comparison of dermatological and postmortem findings are

¹ British Medical Journal, December 11, 1909.

² Medizinische Klinik, January 2, 1910, vol. vi, No. 1.

necessary to clear up this picture; it seems to involve some reciprocal action between the genital apparatus and the thyroid.

TREATMENT.—Von Noorden¹ has found *ferruginous mineral waters* more beneficial and less liable to produce constipation than pharmacopeial iron preparations, and also that *arsenic*, in the form of a mineral water, is better tolerated than in any drug preparation. Both iron and arsenic act by stimulating the blood-producing apparatus, reinforcing the too feeble excitation from the ovaries. Polyneuritis and optic neuritis have followed the use of the cacodylates and atoxyl. It is impossible to foretell with these drugs the amount of arsenic that will be liberated, and thus become therapeutically and toxically active.

The constipation which follows the use of iron may be due, he says, to too great reliance upon the rectal syringe. Constipation from stagnation above the rectum can be cured by dietetic measures without fail, but when the rectum has been trained to sluggish action, by too frequent use of the syringe, conditions are far less favorable for a cure. In his experience, this is almost the sole cause of obstinate rectal constipation.

He protests against the restriction to vegetable *food* which is now the fashion, stating that it is distinctly harmful in chlorosis, such patients needing from 100 to 120 grams of albumin daily, preferably in the form of meat and best ingested at breakfast. This is a comparatively small amount, but it is more than the patients would eat, as a rule, if left to themselves.

Systematic *breathing exercises*, if persevered in, will improve the ability to walk and climb stairs, etc., long before the blood shows any decided change for the better. Chlorotic girls generally breathe superficially, and this entails retraction of the lung and an unusually high diaphragm, with resulting air-hunger.

Welland² emphasizes the importance of the *elimination of water*, based on his supposition of functional kidney insufficiency. This should take place by kidney, bowel, or skin, but the intake of water must be limited at the same time, and he recommends taking as little salt with the food as possible. Leva³ gives details of a *salt-poor diet*, based on 360 analyses. He discusses the menus that can be made up from foods containing naturally only small amounts of salt, and states that no harm results from abstention from salt. Meat and meat soups seem to need salt for the sake of palatability. Celery, spinach, and cauliflower contain much salt. Other vegetables, bread without salt, cereals, beverages, unsalted butter, cream, eggs, etc., form a liberal diet. Canned goods and mineral table water contain much salt. Horseradish, mixed pickles, or mustard can disguise the lack of salt.

¹ Loc. cit.

² Loc. cit.

³ Medizinische Klinik, May 15, 1910, vol. vi, No. 20.

While he agrees with most authors that chlorosis is essentially a disease of young girls, Conti¹ reports 3 cases between the ages of fifty-seven and sixty years, with general progressive weakness, lack of appetite, slight edema and pallor, for which no cause could be discovered until examination of the blood revealed typical chlorosis, with rapid recovery under iron. When one preparation of iron failed to benefit, another answered the desired purpose. He advises changing the preparation in three or four weeks, or changing the mode of administration, the physician choosing between gastric, hypodermic, and intravenous methods.

Leukemia.—The confusion which has existed for the past few years in regard to this subject, with its many forms and bewildering terminology, has not lessened during the past year. In fact, as the mass of literature is daily increased by reports of insufficiently studied cases, and as many authors attempt to differentiate and christen each developmental form of the protean myelogenous cell, the confusion becomes steadily greater. It has become impossible to take for granted what cells any writer refers to by certain terms, and his description must be laboriously read to make sure. This condition is due, at least in part, to a lack of appreciation of the fact that leukocytes are products of growth and evolution, and that although, in normal cases, few of the intermediate stages are seen in the circulating blood, yet once let that development be sufficiently disturbed, and every, or any, transition form may appear.

The trend of recent feeling seems to be toward a partial uniting of the various forms of leukemia and a simpler classification, but no such tendency can be observed with regard to the naming of the individual leukocytes, and, until this takes place, little can be accomplished.

ETIOLOGY.—There has been no light shed upon the cause of any of the forms of leukemia as yet, and such observations as have been made deal rather with probable predisposing conditions and depend upon coincident findings in several cases. The usual statement that race, season, occupation, or place of residence have no special bearing has been confirmed, cases being reported from every part of the world. Goheen² reports one case of myelogenous leukemia from India, in 7500 cases seen at a dispensary, and Vincent³ reports a case, also of the myelogenous type, in an Igorotte, while Jefferys and Maxwell⁴ state that leukemia has been reported once or twice in China.

Every decade of life has been represented in the cases reported during the year, from infancy to a woman aged sixty-seven years, but the cases have been more equally divided between the sexes than would correspond with the figures usually given of about 60 per cent. in males.

¹ *Riforma Medica*, May 23, 1910, vol. xxvi, No. 21.

² *Indian Medical Gazette*, August, 1910.

³ *Journal of the American Medical Association*, April 30, 1910.

⁴ *Diseases of China*, Philadelphia, 1910.

The influence of trauma upon the development of a leukemia has been discussed by Steinon,¹ who states that, in 10 cases of leukemia observed by him, trauma was seen in 2, but in neither case did it seem to have had any great bearing. On the other hand, Steinhaus² reports a case which appeared to him to have developed after an injury. The wound was made by a piece of iron, and was situated near the nose; it healed perfectly, but several weeks later swelled, and an abscess formed which invaded the muscles and periosteum. The patient, a man aged forty years, had been in perfect health, but from the date of the injury steadily declined and died in eight months. The blood showed a lymphocytosis of 60 per cent.; the total count is not stated. The author quotes Ebstein, in his address at a recent Congress of Medicine, at Budapest, that leukemia rarely attacks a healthy person, but develops after trauma, malaria, syphilis, repeated pregnancies, or prolonged lactation. No other reports emphasize this point, but Wolfer³ reports a case in which he feels that a previously existing infection was of etiological importance. The patient, a man aged forty-three years, had been suffering from furunculosis and dermatitis, but had remained in fair general health. Suddenly a generalized enlargement of the lymph glands developed, with edema coming on over night and accompanied by weakness and prostration. His blood was then, for the first time, examined, and showed 36,840 white blood cells per c.c., of which, 30 per cent. were myelocytes. The case ran an acute course, and death occurred in a little over four months; the highest count recorded was 117,200 per c.c., and the highest myelocyte figure 40 per cent. The author considers this a case of acute myelogenous leukemia; he collects 20 such cases from the literature, and concludes that all acute cases are myelogenic. He discusses at length the possibility of septic infection playing a role in the etiology of leukemia, quoting several older authorities, but he presents no conclusive evidence.

While discussing this point, it might be well to refer to the claim by several authors that leukemia rarely occurs in tuberculous subjects. Moorhead,⁴ in his report of a case of acute leukemia with autopsy, states that healed tuberculous lesions were found in some of the glands. He comments upon the rarity of this finding, and quotes Sussman to that effect. In only 2 other cases, of those reported this year, is any mention of tuberculous lesions made.

That the relationship of leukemia and tuberculosis seems to be of some importance is further evidenced by the experimental work done by Hirschfeld and Jacoby.⁵ These investigators confirmed the work of

¹ Soc. d'anat. path de Bruxelles, February 17, 1910.

² Presse Médicale Belge, 1910, vol. lxii, p. 154.

³ New York Medical Journal, November 26, 1910.

⁴ Dublin Journal of the Medical Sciences, June, 1910.

⁵ Berliner klin. Woch., January 25, 1909.

d'Ellerman and Bang, and demonstrated that leukemia in fowls can be transmitted by intravenous injections of emulsions of the hemopoietic organs of a leukemic fowl. They succeeded in thus transferring the condition through four individuals. They also observed a mixed leukemia in a fowl with generalized tuberculosis, and these conditions they coincidentally transferred for four generations. Further work in this line has been done by Rozental.¹ No conclusions can be safely drawn from these results, but they are very suggestive.

No case of a woman, having recognized leukemia of any type, giving birth to an infant with leukemia at birth, or which soon developed leukemia, has as yet been reported. Leukemic women have given birth to normal children, and infants with apparently congenital leukemia have been born of normal mothers, but a case of direct transmission has not been observed. Brandenburg² has reported the history of a family in which the last two children dying of symptoms similar to those with which several former children had died, were found to have leukemia. Unfortunately, both the observations of the earlier children and the blood examinations of the two latter were incomplete, and this report, which might have been so valuable must be very cautiously received.

AGE.—It is of great interest to note how much more frequently leukemia in infancy is being reported of late years. This is in a large measure due to the more routine employment of stained preparations and of differential counts of the leukocytes, for in many cases it is only by these methods that leukemia can be diagnosticated. This is especially true in those cases in which the leukocytosis is not too great to be attributed to other causes. The occurrence of leukemic blood findings, with only a moderate leukocytosis, seems to be more common in children than in adults, but we must constantly bear in mind the physiological lymphocytosis of infancy, and the ease with which myelocytes appear in the circulating blood at this age, and be careful to differentiate between true leukemias and those blood pictures which have been named "*leukämieähnlich*," by Pinkus. A border-line case, which may be quoted as an example, is one reported as a case of myeloid leukemia by Dallas³ in an infant, aged twenty months. The child was asphyxiated at birth, but recovered. She was always pale and in only fair health, and, at the age of eight months the spleen was noticed to be enlarged. When seen at the age of twenty months, the blood showed 36,452 leukocytes, and the differential count gave: Polymorphonuclears, 29 per cent.; small lymphocytes, 32 per cent.; large mononuclears, 17 per cent.; eosinophilic polymorphonuclears, 1 per cent.; neutrophilic myelocytes, 20 per cent.; eosinophilic myelocytes, 1 per cent. The

¹ Medical Obozr., vol. lxxxii, p. 657.

² Fortschritte der Med., 1909, vol. xxxi.

³ Arch. de Méd. des enfants, 1910, vol. xiii, p. 213.

child died in two months, and there was no autopsy. A very similar case, but one which may more certainly be diagnosticated leukemia, is reported by Whipham.¹ This case was in a male infant, aged eighteen months, who was healthy until one year of age. Physical examination revealed a weak, dark-skinned infant; the skeleton was normal except for the widely open fontanelles. The lymphatics of the neck, axillæ, and inguinal regions were just palpable and somewhat hard. The abdomen was very large, due chiefly to the enormous spleen, which extended half way across and four and one-half inches below the umbilicus; the liver was also enlarged, extending one and one-half inches below the tip of the ninth rib. The blood examination showed: Red blood corpuscles, 4,080,000; white blood corpuscles, 63,400; hemoglobin, 80 per cent.; and the differential count: Polymorphonuclears, 32.4 per cent.; small lymphocytes, 5.2 per cent., mononuclears, 18.8 per cent.; transitionals, 12.8 per cent.; eosinophiles, 2.8 per cent.; basophiles, 0.6 per cent.; neutrophilic myelocytes, 25.8 per cent.; eosinophilic myelocytes, 1.6 per cent.; nucleated reds, 1.6 per cent. per 100. The white blood cell count rose in ten days to 71,800, and ten days later to 101,000. At the time of the report, the child was steadily getting worse. In his discussion of this case, the author quotes Hutchinson, in the Goulstonian lecture for 1904, as saying that only 5 cases of leukemia in patients under ten years of age existed in the literature. It was in the same discussion that Forsythe spoke of the case mentioned above, in which myelogenous leukemia was discovered in a recently delivered woman. The baby, a fortnight old, was examined, and no blood changes nor enlargement of the spleen was found. A careful paper on the subject of *splénomédullary leukemia in childhood* was published during the year by Karsner.² After a critical study of the literature, he accepts eight cases as satisfactory, and to these he adds 1 of his own. He emphasizes the high lymphocytic count in these cases, which Stuart and Campbell suggest is due merely to the natural tendency of the blood in childhood, but which he believes may be due to a misinterpretation of the small non-granulated myelocytes. Karsner concludes that the leukemias of childhood are usually of the lymphatic type, and that the splénomédullary form is distinctly rare, and, further, that leukemias have a distinctive tissue pathology and histology by which a competent examination can determine the diagnosis with accuracy. The article by Babonneix and Tixier,³ which appeared but a short time before, also contains a series of 8 cases of splenomyelogenous leukemia, all collected from the literature. It is interesting to note that in these two series, each of 8 cases from the literature, only 2 cases are found in both series. Combin-

¹ Proceedings of the Royal Society of Medicine, 1909-1910, vol. iii, Section on Study of Diseases of Children.

² University of Pennsylvania Medical Bulletin, 1909-1910, vol. xii.

³ Arch. de Méd. des enfants, September, 1909.

ing the two series, we have, as a total, 15 cases accepted by one or other of these authors. In comparison to this figure, Babonneix and Tixier, in the same article, report 13 cases of the lymphatic type in children. This type is usually considered more common in childhood, and several cases have been reported recently: Chisholm,¹ in a child aged three and one-half years, and Cooke,² in a boy aged nine years.

SYMPTOMS AND COMPLICATIONS.—*Intramuscular hemorrhages* in myeloid leukemia are very fully discussed by Lesieur and Froment.³ They made a thorough study of the condition, and conclude that such hemorrhages may be merely a part of a general hemorrhagic syndrome, or they may form an isolated incident. The diagnosis is sometimes difficult, since the local symptoms and the accompanying fever often suggest an abscess. Puncture gives blood which shows approximately the same cytological count as the circulating blood. The occurrence of such hemorrhages in a case is prognostic of an early termination. Little is definitely known of the causation, but simple muscular contraction seems to be sufficient.

I have recently seen a large intramuscular hemorrhage develop as a result of a slight stumble in the ward, in a case of splenomyelogenous leukemia under my care. The hemorrhage took place in the left thigh, later became infected, and required drainage. The pus obtained showed all the types of cells seen in the circulating blood, thus differing from the pus formed in those cases by infection without hemorrhage. Following this complication the patient became very much weaker and a fatal termination seemed imminent, but he slowly improved and reached a better condition than before the accident. Whether in this case the intercurrent infection had the beneficial results that have been claimed for it, is impossible to tell. The patient continued to improve, and when last heard from was farming on a small scale, and being treated weekly at a near-by town with the *x*-rays over his long bones.

Warthin⁴ reports 3 cases of myeloid leukemia in which *priapism* was a prominent symptom. In each case it was of prolonged duration. At autopsy he found the spaces in the corpora cavernosa filled with myeloid thrombi, which may explain the appearance of the condition, although a nervous origin has also been suggested. The discomfort in such cases may be very extreme, and, indeed, this may be the first symptom and the immediate cause of the patient's seeking medical aid. In a case which I afterward saw, the onset, save for a moderate period of indefinite ill health, was sudden; priapism developed during the night, and persisted continuously for over five weeks. The pain was intense, and required the use of powerful sedatives. It was the priapism which

¹ Australian Medical Gazette, March, 1910.

² Virginia Medical Semi-monthly, September 23, 1910.

³ Soc. Méd. des Hôp., June 4, 1909.

⁴ International Clinics, 1909, vol. iv, ser. 19, p. 280.

led to an examination of the blood, revealing a typical picture of splenomyelogenous leukemia. The patient markedly improved and the priapism disappeared. Stanjeck¹ has recently published a monograph on this subject.

Disturbances in the upper air passages are being more and more considered of importance in leukemia, not only as symptoms and complications, but as bearing a possible etiological significance. Imhofer² states that in leukemia the mouth and throat may present a diffuse catarrhal affection, or the lymphatic tissues, follicles, and tonsils may alone be involved. In more severe degrees, the process may be ulcerative, or even of a gangrenous nature. A diagnosis cannot be made with certainty from the throat, although a very rapid and marked enlargement of the tonsils is suggestive, especially if small sugillations occur. He quotes several interesting cases from Hanzel, one of which seems to show a relationship between angina and leukemia. A young man had a severe sore throat, followed, after a fall from a horse, by fatigue and emaciation; four weeks later the angina recurred, with ulceration in the tonsil and enlargement of the glands throughout. Death ensued in four weeks from acute leukemia. Imhofer discusses the removal of adenoids or enlarged tonsils in leukemic children. In 4 cases this operation proved fatal, 1 case dying suddenly several hours later from an extensive postoperative hemorrhage; in the other cases, from two to four weeks elapsed after the operation before the child succumbed to increasing weakness and aggravation of the signs of leukemia, suggesting that the operation had transformed a chronic process into an acute form. Thus, the danger from hemorrhage is not the only peril in such operations, and every care should be taken to exclude leukemia before such operations are performed. Rapid recurrence after operation is also suspicious, especially if the swollen parts are redder and harder than with tuberculous lesions. Edema, however, is not seen as it is in tuberculous lesions of the throat. He concludes that treatment of the leukemic disturbances of the nose and throat can be only symptomatic, and that the same applies to pseudoleukemia and lymphosarcoma. The only case reported during the past year in which death was due to such involvement was by Warthin,³ a case of myeloid leukemia which died of leukemic infiltration of the larynx, with some hemorrhage into the surrounding tissues.

Little has been added to our knowledge of the *nervous manifestations* of leukemia. A satisfactory summary is given by Woods;⁴ headache and neuralgic pains are almost constant findings, anesthesia, hyperesthesia, and various paresthesiæ, such as burning and numbness, mark involve-

¹ Borna. Leipzig, 1909.

² Centralbl. f. d. Grenzgebiete der Med. und Chir., April 4, 1910.

³ Loc. cit.

⁴ Pennsylvania Medical Journal, April 10, 1910.

ment of particular nerve trunks and tracts. Paralysis of cranial nerves are more common than of the nerves of the extremities; paraplegia from the mouth down has several times been observed. An apoplexy with hemiplegia, rapidly developing coma, and death may be the first announcement of cerebral trouble. Mental disturbances appear as melancholia, maniacal outbreaks, delirium, and coma. The special senses may be affected, troublesome tinnitus aurium and a moderate degree of deafness may occur, visual defects, from mere scotomata to complete blindness, are frequent. The *eye changes* in leukemia are well considered by Verderame.¹

BLOOD. The morphological study of the blood in leukemia has not yielded any new information during the past year. The description of the early developmental forms of myelocytes seen in the acute type has renewed the interest in the blood morphology, and has resulted in many cases of the acute myelogenic leukemia being reported, and a corresponding decrease in the mention of cases of the acute lymphatic type. Some authors have even gone so far as to suggest that all acute cases are myelogenic.

Last year, in these pages, the details were quoted of a staining reaction described as being characteristic for the myeloblasts seen in the acute myelogenic form of leukemia, and depending upon the presence of oxydase granules in these cells. This method does not seem to have been very widely used, and only an occasional mention of it occurs in this year's literature. Bingel² reports a case of acute "myeloblasten leukämie" in a servant girl, aged nineteen years. She had been previously healthy, and her illness was only of four weeks' duration, with fever, jaundice, and enlargement of the spleen. Hemorrhages occurred in various parts, including the retina. Her blood rapidly became anemic, the hemoglobin falling from 60 per cent. to 20 per cent., with an almost corresponding decrease in the red cell count. The leukocytes varied from 45,000 to 66,000, and sank later to 20,000 per c.c. The differential count showed: Myeloblasts, 74 per cent.; myelocytes, 3 per cent.; mast cells, 0.5 per cent.; transitionals, 9 per cent.; polymorphonuclears, 6 per cent. When preparations were stained by the Röhman-Spitzer-Schultze method, the myeloblasts gave a blue granulation. Death occurred from diphtheria, and the diagnosis was confirmed at autopsy.

Most authors have been satisfied to diagnosticate the acute myelogenous cases by the morphology of the young myelocytes as prepared with Wright's stain. This may be done correctly, especially if the entire blood picture is studied, since it will often be almost impossible to classify individual cells. It is this type of cell which is being described

¹ Virchow's Archiv, June, vol. cc, pp. 3 to 383.

² Wissenschaftliche Vereinigung am Städt Krankenhaus zu Frankfurt a M., July 6, 1909.

under so many names—myelogonien, premyelocyte, myeloblasts, etc.—all referring to the same cells.

A short abstract of a case reported by Rieux, Savy, and Courjon¹ will give the views held by many French investigators. The authors decide that there are two forms of acute leukemia, the lymphatic and the myeloid, both types being characterized by a preponderance of large non-granulated mononuclear cells which they call "macrolymphocytaires." Their description of these cells leads one to believe that they are the same forms as the myeloblasts of other writers. These cells, they conclude, are truly the parent cell of every form of leukocyte. It is by the rest of the blood picture that they determine which type of acute leukemia is present. The case they report was in a woman, aged forty-nine years, with a total count of 150,000, and the diagnosis was finally verified at autopsy, the blood changes being found in the various hemopoietic organs. I wish to quote, in abstract, the differential count, if only to impress the confusion which exists in terms: 44 per cent. macrolymphocytaires (lymphoidocyte des unicistes myeloblasts des dualistes); 9 per cent. neutrophilic myelocytes; 4 per cent. eosinophiles of all forms: (a) promyelocytes, (b) myelocytes (round nucleus), (c) metamyelocytes (reniform nucleus), (d) polymorphonuclears; 10 per cent. lymphocytes (small); 33 per cent. cells showing azurophil granules, not identical with mononuclears or transitionals of normal blood, but varying in resemblance between these and the polymorphonuclears. Some are large and resemble transitionals, but with marked polymorphic nucleus, these resemble the cells called by the Germans, the type of Rieder.

This mention of cells resembling transitionals is more strongly emphasized in a case reported by Travers Smith and Earl,² in which the total count was 192,000. Of this number, 88.7 per cent. were cells having the general characteristics of the transitionals of normal blood, but which had red granules with the triacid stain, fine azurophil granules with Leishman's stain, and in which methylene blue showed fine basophil granulations.

It is impossible, at present, to do more than to state the varying views, and to hope that in the near future order will arise from this chaos. To any reader who desires to acquaint himself with the German viewpoint, the article by Zypkin³ may be recommended.

Karyokinesis. William Pepper⁴ reports 2 cases, 1 of acute lymphatic and 1 of chronic splenomyelogenous leukemia, in both of which there occurred in the circulating blood many cells undergoing karyokinesis. Examples of almost every stage of this process were seen and photo-

¹ Arch. des mal du cœur, des vaisseaux et du sang., July, 1910.

² British Medical Journal, 1910, p. 636.

³ Berliner klin. Woch., October 31 and November 7, 1910.

⁴ University of Pennsylvania Medical Bulletin, 1909-1910, vol. xxii, p. 360.

graphed, and, in the case of acute lymphatic leukemia, the karyokinetic cells were so numerous that several of the microphotographs show two in one field. With the thought that if dividing cells are an earlier stage of development than those usually seen in the circulating blood, something might be learned concerning a common origin, or, at least, the possible relationship of the characteristic cells of these two types of leukemia; the author compares the cells showing karyokinetic changes in these two cases of leukemia. He concludes that there is no more resemblance between the karyokinetic cells in acute lymphatic leukemia and in splenomyelogenous leukemia than there is between the typical large lymphocytes and the myelocytes of the same diseases.

Opsonic Index. This has been studied in two cases of acute leukemia by Parvu and Foy¹, and their results in this condition differ from those obtained in earlier work in chronic myelogenous leukemia. In this latter, as well as in pernicious anemia, both the opsonic index, by which is meant the opsonizing power of the serum, and the phagocytic value of the leukocytes, were found to be distinctly diminished. In the cases of acute leukemia, however, their conclusions are as follows: (1) The polymorphonuclears alone remain gifted with phagocytic power, and not a single example of phagocytosis was seen in a primordial myelocyte. (2) The opsonic index was much lowered, possibly due to the absence of alexine. (3) The phagocytic value of the leukocytes was increased. They are not able as yet to draw any conclusions from their work. The two cases of acute leukemia later reported by Vaquez and Foy,² in which the opsonic index is stated to have been lowered, are probably the same cases.

Blood cultures have yielded no constant findings in any type of leukemia. Occasional bacteriological findings are reported, but for the most part these appear to be accidental or terminal.

TREATMENT. No advances have been made in the last year in any line of treatment for leukemia, except with the x-rays, and here chiefly in refinements of technique, and a more thorough study of the contraindications for the use of this measure.

The thought that a septic infection played a part in the causation of leukemia has led to treatment being directed against such a condition. Ireland³ reports a case in a woman, aged twenty-eight years, who had suffered from anemia for three years. Her blood picture was found to be typical of splenomyelogenous leukemia, and her spleen extended down to within one and one-half inches of her symphysis. She was treated by applications of radium over the spleen and the injection, every fourth day, of streptococcic vaccine in doses of 50,000,000. The results were very satisfactory, the spleen returned to normal size, and the patient improved very markedly. This is an isolated case, and no others simi-

¹ La Tribune Médicale, 1910, vol. xliii, p. 117.

³ Australian Medical Journal, June, 1910.

² Ibid., p. 389.

larly treated have been reported this year. Baldauf's work in this line was quoted last year.

Medicinal measures have not been found sufficient to hold the disease in check, but are constantly used as almost essential accessories to the x -rays. The use of the x -rays has been limited almost exclusively to the chronic splenomyelogenous type, no cases, either of the lymphatic or of the acute myelogenous type, treated by this means having been reported. In fact, it is probable that, in the acute leukemias, this treatment is disadvantageous. In the chronic myelogenous type the results have been encouraging; of the 14 cases treated with x -rays with satisfactory reports in the literature of the last year, all but one were, for a time at least, improved. The one unsuccessful case was reported by Hayes,¹ the technique used being irradiations of the spleen, which caused profound reactions. The technique used in the other cases varied considerably; in a case of Simpson's² the patient improved while the treatments were given over the long bones, but immediately became worse when the whole body was treated. Barjon and Charlet³ obtained good results by giving treatments over both spleen and long bones, and in general this has given the most favorable results. However, Haret and Beclere⁴ produced a symptomatic cure by x -ray treatments over the spleen alone. Their patient was a man, aged thirty years, with the characteristic symptoms and blood of chronic myelogenous leukemia. When first treated, he was in very poor condition, but very rapidly improved. The spleen did not return entirely to its normal size, and the blood still showed occasional myelocytes, although the total count was low. For these reasons, the treatments were continued long after apparent health had been restored. The technique consisted of irradiations over one-quarter of the spleen at a time, using 3H at 20 cm. from the anticathode. At first, one treatment a week was given, but later only every other week. The authors compare the x -rays in leukemia to mercury in syphilis—not a cure, but a guarantee of restraint.

The *contraindications to x -ray treatment* and the indications for its withdrawal in cases so treated have been much discussed. Oettinger, Fiessinger, and Sauphar⁵ suggest that Röntgen-ray treatment of leukemia induces both direct and indirect leukolysis; the latter being the result of a leukolytic ferment which seems to be produced in some way under the influence of the rays, and which prolongs the leukolytic action. The red corpuscles also feel the effect of the rays to some extent, so that the blood picture may come to resemble that of pernicious anemia. They conclude that there is always the peril with radio-

¹ Dublin Journal of the Medical Sciences, June, 1910.

² Detroit Medical Journal, May, 1910.

³ Lyon Méd., 1910, vol. cxiv, p. 253.

⁴ Bull. et Mém. Soc. de Radiologie Méd. de Paris, 1910, No. 16.

⁵ Arch. des mal. du cœur, etc., May, 1910.

therapy that the chronic myelogenous type may become transformed into an acute phase, and therefore the technique should be cautious, with long intervals, especially when the patient reacts markedly to the exposures. Clarke¹ likewise emphasizes the importance of carefully watching the state of the blood and urine during treatment. He reports 4 cases; the presence of a slight abuminuria in one, and of marked glycosuria in another, did not seem to form any contraindication to x-ray treatment.

The appearance of numbers of myeloblasts in the blood of a case of myelogenous leukemia, undergoing treatment by the x-rays, is thought by Rist and Beclere² to be a prognostic sign of very gloomy import. They believe the cells to be identical with those seen in acute leukemia, and that their appearance in the blood is not the result of the x-ray treatment, although each of the three cases in which this was observed by them was under active treatment. A similar observation was made by v. Jagic and Neukirch in a case of chronic myeloid leukemia. In their case, the cells which appeared, while morphologically not differing from myeloblasts, did not show the oxydase reaction. The authors suggest that this may have been due to x-rays having caused a degeneration of the oxydase cells, and that this may be one of the dangers of this treatment. They conclude that the blood, during treatment, should be examined at intervals for the oxydase reaction of the mononucleated cells.

Chloroma. Little can be said concerning the year's work in chloroma. The condition is so rare, and the opportunities for its study so infrequent, that only a few cases are annually reported. The influence of the work on the acute leukemias with the proper recognition of the myeloblasts has acted also on this condition, and the cells which were formerly known as large lymphocytes, or chloroma cells, are now often being classed as myeloblasts. Further, the lymphoid type of chloroma, just as the lymphoid type of acute leukemia, is being discarded. This brings chloroma even closer to acute leukemia, and to Adams' definition of it as an aberrant form of myelomatosis.

Of the cases reported, an interesting one is by Wynter.³ The patient, a female child, aged three and one-fourth years, had always been delicate, and a facial deformity had been noticed for five months, and had been gradually increasing. The face was large, with protuberant bones, over which the skin was tense; there was distinct exophthalmos on the right. The child was of average intelligence, and complained of no pain. There was slight enlargement of the glands of the neck. The patient lived about four months from this time, but the course was steadily

¹ Bristol Medical and Chirurgical Journal, September, 1910.

² Compt. rend. Soc. de Biol., March 18, 1910, vol. lxxiii.

³ Proceedings of the Royal Society of Medicine, 1909-1910, vol. iii. Section on Study of Diseases of Children, pp. 19 and 96.

down hill. There was wasting, and the complexion became yellowish green toward the end. Double optic neuritis developed, and death occurred from asthenia. Ten days before death the blood, which at first had been more nearly normal, showed: Red blood cells, 770,000; white blood cells, 170,000; and hemoglobin, 24 per cent. In the stained preparations, the red cells showed every evidence of anemia, and there were many normoblasts and megaloblasts. The differential count of white cells showed: Polymorphonuclears, 30.6 per cent.; small mononuclears, 6.8 per cent.; chloroma cells, 62.6 per cent.; and a few large myelocytes. All gradations between a typical polymorphonuclear and a large mononuclear were seen. The autopsy showed diffuse chloromatous growth transforming all the red marrow and being conspicuous in the flat bones and the ends of the long bones, which also showed deposits beneath the periosteum. The glands in the iliac, vertebral, and cervical regions were all affected, and the spleen was of a similar color. There were, however, no distinct secondary growths. The article is illustrated with a beautiful Lumière colored photograph which impresses the characteristic coloration better than any description.

A case in which this green color was not present and yet which presented many of the other characteristic symptoms of chloroma is reported by Winocouff.¹ He discusses the diagnosis in such a case, and quotes von Benjamin and Sluka that the green color is not absolutely specific for chloroma. His case occurred in a boy, aged four years, and he states that, of 50 reported cases of chloroma, 50 per cent. occur between the ages of three and fifteen years, and that only 10 cases were in girls. The boy exhibited bony tumors of his skull and marked exophthalmos, his spleen and liver were enlarged, and he developed a pleural effusion. His blood showed distinct anemia and a slight leukocytosis, but the differential count was almost normal, an occasional myelocyte being found. At autopsy, the tumor was found to involve the left orbit, cranial bones, and, probably secondarily, the spine. The tumors were multiple, soft, and yellowish, and upon microscopic examination showed the characters of a round-cell sarcoma with but little interstitial tissue. The spleen and bone marrow were microscopically without change. This case cannot, from the report, be properly classified, but serves to show the existence of border-line cases between chloroma and sarcoma.

A case clinically very similar to the preceding, but in which there was unfortunately no autopsy, is reported by Tresilian.² In this case there was generalized glandular enlargement, in addition to the large bony bosses on the head. The blood showed a moderate leukocytosis, of which 7.2 per cent. were myelocytes.

¹ Archiv f. Kinderheilkunde, vol. lii, p. 33.

² British Journal of Children's Diseases, December, 1910.

Hemophilia. The work of the year in this disease has been directed chiefly along the lines of etiology and treatment. The symptomatology is fairly definite, and little or no attention has been given to it.

Wright, quoted by Wood,¹ defines hemophilia as a disorder depending upon a congenital defect in the coagulating power of the blood, and characterized by immoderate spontaneous and traumatic hemorrhages, serous hematomas, and recurrent effusions into the joints.

ETIOLOGY.—He explains the hemorrhages on the basis of Morawitz's theory of the coagulation of the blood, namely, that the circulating plasma contains fibrinogen and a special ferment, *thrombogen*, while the leukocytes and all the cells of the organism produce another substance called *thrombokinese*. This latter does not exist as such in the serum, but any breaking down of blood or tissue cells sets at liberty this thrombokinese, which, in the presence of the calcium ions, transforms thrombogen into thrombin, and this, in turn, converts fibrinogen into fibrin.

Sahli² assumes that hemophilia is due to an anomaly of the cellular elements of the blood and of certain other cells, especially in the walls of the vessels, entailing defective production of thrombokinese. This latter factor is evident when the bleeding continues, although the coagulating property of the blood, after much has been lost, may be normal or above. This was first demonstrated by Wright.

Kottmann and Lidsky,³ from their experience with the coaguloviscosimeter, believe that the trouble in hemophilia is lack of thrombokinese, and that hemophilic hemorrhage can be arrested by supplying this from without.

Addis⁴ says that coagulation of the blood flowing from a wound is induced by thrombokinese added to it from the tissues, and the rapidity of coagulation varies directly with the amount of this thrombokinese.

In a paper published somewhat later, Addis⁵ investigated the cause of hemophilia in connection with the calcium, the thrombokinese, and the prothrombin. Various quantities of calcium were added to hemophilic plasma, but no amount reduced the coagulation time to normal. Calcium was, therefore, not the cause. With various amounts of thrombokinese the same result was obtained, except when very large quantities were added when coagulation was almost instantaneous in both normal and hemophilic plasmas. As much thrombokinese was present in hemophilic as in normal serum, and as much could be extracted from hemophilic blood corpuscles as from normal corpuscles. Thrombokinese was, therefore, not the cause. There was no quantitative deficiency

¹ Australian Medical Journal, 1910, vol. xv, p. 216.

² Deutsches Archiv für klinische Medizin, 1910, vol. xcix, Nos. 5 and 6.

³ Münchener medizinische Wochenschrift, January 4, 1910, vol. lvii.

⁴ Quarterly Journal of Medicine, October, 1910.

⁵ British Medical Journal, November 5, 1910.

as regards prothrombin in hemophilic plasma, but a qualitative difference was present, which showed itself in the unduly long time required by the hemophilic prothrombin to change into thrombin in the presence of calcium and thrombokinase. This fault in the prothrombin was thought to be the sole cause of the delay in the coagulation, because very small quantities of normal prothrombin, when added to hemophilic plasma, reduced the coagulation time to normal.

TRANSMISSION. Hubbard¹ gives certain laws governing transmissions (quoted from Kinnicutt in Crile's "Hemorrhage and Transfusion"):

1. Daughters of a bleeder father are exempt, but may transmit to male offspring.
2. The sons of a bleeder father are also, as a rule, exempt and do not transmit.
3. The daughter of a bleeder father may transmit to one, several, or all of her offspring.
4. In the case of several daughters of a bleeder father, one only, or several, or all may transmit.
5. There may be occasionally direct transmission from father to son through several generations.
6. The disease does not appear in the issue of the sons of a bleeder family who are themselves not bleeders.
7. There is not always evidence of any hereditary influence.
8. Late statistics show that the ratio of females to males is one to thirteen.

McNabe² reports the history of a family of hemophiliacs which has been traced back four generations, and in every case the transmission has been through the female.

Squires³ reports the case of hemophilia in a female in whose family, for three generations back, no hemophilia could be traced. She had a history of numerous hemorrhages in infancy, and died at the age of two and one-half years of bleeding from the mouth.

Osler⁴ mentions Bulloch's statement that it is unlikely that any female cases of hemophilia are genuine, and thinks that it is difficult not to accept the following case as such: A girl, aged nineteen years, was seen suffering with epistaxis and purpura. A brother was a bleeder, and her father in his youth had frequent epistaxis. A paternal uncle bled the same way, and his son was a bleeder. Mother's side showed no bleeders. The patient had always bled freely when cut, when teeth were drawn, or when gums were rubbed hard. A year before, she had had soreness of both shoulder-joints. She died as a result of recurrent profuse hemorrhages.

¹ *Annals of Otolaryngology, and Laryngology*, 1910, vol. xix, p. 25.

² *Southern Medical Journal*, December, 1910.

³ *British Medical Journal*, 1910, vol. i, p. 1168.

⁴ *Lancet*, 1910, vol. i, p. 1236.

Bulloch¹ does not consider the above case one of hemophilia, and thinks that Osler has not even convinced himself of this.

Arnsperger² believes it to be certain that hemophilia is usually hereditary, and that the tendency can be handed down. The transmission is brought about through the females of the bleeder's family who themselves are usually free from it. Marriage, he thinks, should not be permitted the females of such a family even if they themselves are not bleeders. Marriage of males of a bleeder family to healthy females may be permitted, provided the males are not hemophiliacs.

TREATMENT. Arnsperger bases his treatment on the fact that the lessened coagulating power of the blood in hemophilia is caused by a lessened formation of thrombokinase on the part of the former blood elements, the cells of the vessel walls, and the blood-building organs. He advises the use of fresh human, horse, or rabbit *serum*, diphtheria antitoxin, or antistreptococcus serum in doses of 10 to 40 Cc. This should be repeated monthly. He thinks that serum therapy seems to act more favorably in sporadic cases than in hereditary ones. Local bleeding should be treated with the usual styptics or serum locally. Hemorrhagic infusions into joints should have rest, compression, and ice; later, massage and passive motion. Puncture should be avoided, if possible. Bleeders must, during all their lives, be careful to avoid accidents, operations of election, and dental procedures, though this caution does not apply to vaccination. Alcohol should be avoided, and food rich in calcium should be freely taken. He recommends the use of *calcium* and *gelatin*.

Hubbard³ believes that calcium salts, gelatin, liq. thyroidei, adrenalin, saline by rectum or intravenously, and milk diet should all be tried before serum be used. He advises a test injection of 1 Cc. first, and observation of results for fifteen minutes before giving larger doses, in order to avoid the unpleasant results of sensitization.

Kottmann and Lidsky⁴ advise all those who have anything to do with hemophiliacs to be instructed to check hemorrhage at once by tamponing with fresh animal blood or serum. The thrombokinase can be obtained at any time by soaking chopped and ground fresh liver from any animal in water, and filtering through an ordinary cloth. The hemostyptic thus obtained does not soon lose its efficacy like ready-made fibrin ferment. It must be made fresh each time.

Wood⁵ has lost faith in calcium salts, and lauds the use of *human serum* and, to a less extent, of animal serum. He gives fresh rabbit, horse, or antidiphtheritic serum in 20 to 30 Cc. doses, frequently repeated, and applies compresses of the above or organic extracts of thymus gland or thyroid tablets locally, or emulsion of sweetbread

¹ Lancet, 1910, vol. i, p. 1300.

² Deutsche medizinische Wochenschrift, 1910, vol. i, p. 1113.

³ Loc. cit.

⁴ Loc. cit.

⁵ Loc. cit.

or extract of fresh spleen. He uses serum as a prophylactic before operating upon bleeders.

Sahli,¹ as practical lessons from his work, believes that hemophilia may be constitutionally influenced by repeated injection of *fresh human blood serum* for the purpose of thrombokinase enrichment by the intermediate link of antikinase production. Another way is by repeated withdrawal of small amounts of blood by puncture of a vein by a fine cannula, for the similar purpose of thrombokinase enrichment by means of the physiological reaction that follows. Experience has shown that there is no danger of hemorrhage in a hemophiliac if the vein is punctured by a fine cannula.

Patek² advises *human or animal blood serum applied locally, subcutaneously, or intravenously*. Human serum is preferable, as there is less danger of anaphylaxis. A prophylactic injection is advisable in cases prior to operation. Subcutaneous injection is usually to be preferred. Transfusion may be employed in massive hemorrhage.

Trembur³ reports a case of a girl, aged thirteen years, who had been a bleeder since the age of five years. When seen, she had menacing hemorrhage from mouth, left ear, throat, and gums, and the breath had a fetid odor. This latter was always present and preceded her hemorrhages. Five Cc. of *sheep serum* injected subcutaneously checked the hemorrhage, and serum locally stopped recurrences. Ten Cc. were given later when fresh hemorrhages occurred, and, still later, more was given. A cure was obtained in this case.

In a later paper, Trembur⁴ treated a girl with *rabbit serum* and she improved considerably, although with the onset of menstruation she succumbed to anemia, in spite of some improvement following an injection of the serum. In two cases he noted the *fetor exore* for a few days before the onset of the hemorrhage.

Wolf and Herry⁵ arrested hemophilic hemorrhage in 9 cases by an injection of 10 Cc. of a 5 per cent. solution of *Witte's peptone*. In some cases two injections were made. The peptone seems to be more energetic and is more easily sterilized than serum. Heating to 120° C. (248° F.) does not alter its properties. It is injected as a 5 per cent. solution in a 0.5 per cent. solution of sodium chloride. There seems to be no danger of anaphylaxis. For local application, an extract of lymphoid organs, spleen, lymph glands, and thymus seems to be as effectual as fresh serum.

Hübscher⁶ has made a special study of the contractures likely to result from joint involvement, and has evolved a treatment based upon

¹ Loc. cit.

² Wisconsin Medical Journal, November, 1910.

³ Mitteilungen aus den Grenzgebieten der Medizin und Chirurgie, 1910, vol. xx, No. 5.

⁴ Ibid.

⁵ Revue de Médecine, 1910, vol. xxx, No. 2.

⁶ Correspondenzblatt für Schweizer Aerzte, April 20, 1910, vol. xl, No. 12.

this. The case which he describes was that of a boy, aged fifteen years, a typical bleeder, from a family of bleeders. The condition in the knees was the characteristic joint process, and there was a fistula in the arm from a hematoma in the biceps, which bled a little at times. Before attempting treatment, Hübscher injected 10 Cc. of normal horse serum into the region of the pectoralis, and within two days the fistula ceased to bleed. The contracture was corrected with a plaster cast from hip to toes, cut out at the knee, with elastic traction on the leg by means of rubber tubing fastened to a projecting iron frame. The boy was not kept in bed, and by the end of the month he was able to use his legs. The last trace of contracture was then reduced under ether after another injection of horse serum. There was no bleeding at any time. Injections of serum were kept up every six or eight weeks for a time. The serum was used less than two hours after it was taken from the horse. By means of this technique he believes that it will be possible to avoid the fatal hemorrhages which have followed operations for supposed tuberculous joints. In doubtful cases the injection should be made to guard against possible hemophilia.

HEMOPHILIA IN CHILDREN. Goodman¹ reports a case in a child, aged two and one-half years, in whom transfusion was performed. The operation took an hour and a half, and was successful, checking all oozing.

Under the name hemophilia neonatorum, Welch² reports a series of cases which includes a number of bleeding babies, in which the etiology of the hemorrhages is unknown. In none of these cases was the hemorrhage due to traumatism. He found, post mortem, that the principal hemorrhage may be either in the brain with extensive laceration, or in the liver, in which case the capsule may be entirely dissected from the surface of the organ. Hemorrhagic spots in other internal organs, and effusions of blood in the various serous cavities, may be found. In some instances, he found the spinal canal filled with fluid blood. Normal human blood serum was used in many of the cases, with prompt and satisfactory improvement.

COMPLICATIONS. Under this heading is a case reported by Larned,³ of typhoid in a hemophilic. The points of interest in connection with the case are as follows.

1. The inheritance came through the father, who was himself a bleeder.
2. This is the first case, to Larned's knowledge, of typhoid in a bleeder.
3. A case of typhoid in a hemophilic may reach a successful termination.
4. No hemorrhages occurred from the intestinal lesions.

¹ *Annals of Surgery*, October, 1910.

² *American Journal of the Medical Sciences*, June, 1910.

³ *Ibid.*, March, 1910.

5. The successful termination of this case may have been due to the fact that at about the age of forty years the hemorrhagic tendency had abated.

6. In this patient's case the principal manifestation of this tendency had been attacks of epistaxis, the only other serious hemorrhages having occurred at the time of an operation for ingrown toe-nail.

Purpura Hæmorrhagica. ETIOLOGY. During the year very few cases of purpura hæmorrhagica have been reported, and no noteworthy advances regarding the etiology of this interesting symptom-complex have been put forward. Nor has any additional testimony been added to the several cases reported during the year 1909 which suggested syphilis as a possible factor in the production of this disease.

To the long list of drugs already mentioned in the causation of purpura hæmorrhagica, a new name was added when Selling¹ reported 3 cases due to *benzol poisoning*. These three cases occurred at a factory for the manufacture of tin cans, in the suburbs of Baltimore, and were all confined to one department, the so-called "coating room." The only essential difference in the processes, as carried on here and in the rest of the factory, consisted in the use of a substitute for solder, a mixture containing pure rubber, rosin, and a coloring matter dissolved in pure benzol, of which ten gallons a day were used and allowed to evaporate in the room. Of the 23 persons employed in this department, 14 were girls, between the ages of fourteen and sixteen, who worked at the coating machines, and among these girls all three of the cases occurred.

Two of the 3 cases died, and upon investigation it was found that of the other employees in that room, 4 in number, 2 men and 2 girls, had a few purpuric spots, but were entirely free from symptoms.

In the drug etiology of purpura hæmorrhagica the *iodides* have long held first place, and in an excellent article, Knowles² has reviewed the literature, and reports 2 additional cases. From the literature he studied carefully 61 cases, exclusive of his own, 11 of which were of the bullous hemorrhagic type, and 50 of the non-bullous, and from them he draws the following conclusions:

"Purpuric eruptions caused by the ingestion of the iodides may be divided into two provisional groups.

"The first group includes the extensive petechial and hemorrhagic, bullous cases, which occur in those individuals with organic disease, particularly of the kidneys or the heart, or with a lowered condition of the general economy, making them more susceptible to the effect of the drug, or with a strong idiosyncrasy to the same.

"The second group includes all cases with a localized distribution, particularly those in which the eruption is limited to the lower extrem-

¹ Johns Hopkins Hospital Bulletin, February, 1910.

² Journal of the American Medical Association, July 9, 1910.

ities or the lower legs, which occur in these individuals in perfect health, and which can be explained only on the theory that a mild idiosyncrasy to the iodide is present.

"Sex and age have nothing to do with the occurrence of the eruption, although most of the cases developed during middle life, and a considerably larger percentage of males were attacked than females.

"The drug was administered in 22 of the 61 cases for syphilis, for rheumatism in 9 cases, and in the remainder in numerous other conditions, none of which apparently exerted any predisposing influence.

"The quantity of the drug given and the length of administration varied so markedly that an average dose or the length of time of continuance cannot be stated, the personal element alone deciding the question of an eruption.

"The eruption was chiefly of one type, either the petechial or the hemorrhagic bullous, although in a few cases other forms of iodide lesions were present.

"In the hemorrhagic bullous cases, although in several the eruption was somewhat generalized, the face and the extremities were mostly involved, particularly the face and the arms.

"In the petechial type the eruption in a great majority of the cases was limited to the lower extremities, particularly the lower portion of the legs; in a few cases, however, the outbreak was somewhat generalized or noted on the upper as well as the lower extremities.

"Mild symptoms of iodism were present in a few cases, and severe reaction to the drug was noted in 2 cases. Edema of the glottis was found in 2 instances.

"Lesions were found on the mucous membranes in a few cases; hemorrhages occurred from the mucous membranes or from various organs in a few others.

"Organic disease of the kidneys and the heart were found in but few—10 out of 61 cases.

"The various salts of iodine are all capable of causing a purpuric eruption.

"The pathological changes of the skin were noted in the immediate vicinity of the bloodvessels and in the walls of the vessels themselves.

"Iodine is rapidly absorbed by all mucous and serous surfaces and rapidly eliminated, chiefly by the kidneys and also through the skin itself. The leukocytes play a distinct role in the absorption of the drug.

"Hemorrhagic bullous cases, of extensive distribution, are frequently fatal, 7 out of the 11 in this series ending fatally.

"Petechial, non-bullous cases rarely terminate in death, unless there is marked disease of the heart or kidneys or a very extreme intolerance to the drug; 2 out of the 50 cases of this type ended fatally."

ETIOLOGY OF THE PRIMARY OR IDIOPATHIC PURPURA. Kelly¹ states: "The cause of primary purpura is not known. By some it is believed to be an infection or an intoxication, but neither the infectious agent nor the toxin has been isolated; blood cultures have usually been negative. Primary disturbances of the nervous system, of the liver, of the blood, and of the bloodvessels have been postulated. Judging from the perhaps analogous action of the hemorrhagin of snake venom, it seems likely that the essence of the process consists in an endotheliosis of the capillaries provoked by some unknown poison; the primary change may occur in the blood."

Regarding the *pathology*, the same writer states: "There are no characteristic lesions, aside from the hemorrhages. In fatal cases there is a high grade anemia of the viscera, with the usual concomitants. There may also be petechial and larger hemorrhages into the serous and mucous membranes. The spleen may be enlarged, and there may be a nephritis (usually glomerulonephritis). No constant or characteristic changes have been found in the bloodvessels. During life, the blood reveals the ordinary changes of secondary anemia; the blood platelets are usually remarkably reduced. The coagulation time of the blood is usually within normal limits, although it may be considerably increased (coagulation delayed); the clot is often less firm than normally."

SECONDARY (SYMPTOMATIC) PURPURA. Two cases of interest were reported during the year that belong to the group of *infectious etiology*; one, reported by Allen,² occurring in a case of typhoid fever that had progressed favorably to the eighteenth day, when hematemesis and violent epistaxis occurred, followed by a purpuric eruption. The reporter states that the symptoms disappeared promptly in a few days under the administration of calcium chloride (10 grains every three hours) and adrenalin locally. The other case, under the title of Infectious Purpura, reported by Repplier,³ occurred in an infant, aged nineteen months, with coalescent ecchymotic areas on both legs, from the buttocks down, which first appeared five days after the onset of a severe facial erysipelas, and later was associated with gastric hemorrhages and symptoms of cerebral and internal hemorrhage. The reporter states that, while no blood culture was made, "the connection between the erysipelas and the purpura seems sufficiently well established."

Illustrating the *mechanical causation* of purpura, Knight⁴ reports a case occurring in whooping cough, in which, after each violent paroxysm of coughing, the purpuric areas would enlarge, or a new focus appear. The spots were especially numerous on the arms, legs, and back, a few in the groin, and one on the face. They were as sensitive as if caused by contusion. When the cough yielded, the hemorrhagic spots receded.

¹ Practice of Medicine, 1910. ² Atlanta Journal Rec. Medicine, 1910-1911.

³ Archives of Pediatrics, March, 1910.

⁴ Journal of the American Medical Association, October 1, 1910.

HENOCH'S PURPURA, first described in 1874, with its symptom-complex of gastro-intestinal crises with pain and vomiting, of mild or severe arthritis, sometimes associated with hemorrhages from the mucous membranes or kidneys, sometimes splenic enlargement, and always attended by some cutaneous lesion ranging from purpura to angioneurotic edema, has been the incentive to several reported cases during the year, but no further light has been shed on the etiology of this interesting condition. Indeed, little has been advanced beyond Osler's writing of several years ago that "the whole group of symptoms is really a manifestation of an as yet unknown mischief, which at one time attacking the skin causes any of the manifestations of the erythema group, from simple purpura to angioneurotic edema, attacking the intestines or stomach causes vomiting, colic, or bleeding, or attacking the kidneys, an acute and sometimes fatal nephritis."

Under the title of Henoch's Purpura or Angioneurotic Edema, Barlow¹ reports two cases, both occurring in boys, aged respectively twelve and four and one-half years. "Perhaps the most interesting feature, common to both, was the occurrence of solid edema, which appeared and disappeared very rapidly. This is not a condition generally met with in Henoch's purpura, but angioneurotic edema is characterized by severe gastro-intestinal crises (which in the first case occurred with melena and hematuria, and in the second with vomiting), and Osler has pointed out that Henoch's purpura has a very interesting connection with angioneurotic edema. In neither case was the spleen felt. The temperature in the first case was slightly raised at the onset (100°), but in the second it was normal throughout. In both, at times the pulse was unduly slow, and for sometime, in the younger boy, was regularly intermittent. There was no involvement of the joints in the first case, and a very slight and transient swelling of one knee in the second. The change in the younger boy's general condition was very rapid. One morning he would appear to be *in extremis*, and the next his illness seemed only slight. Conti regards the disease as of nervous origin, affecting the vasomotor nerves, and certainly, in these two cases, the symptoms might be explained by the presence of a toxin acting mainly upon the sympathetic nervous system."

Howland² reports a case of Henoch's purpura with spinal cord symptoms, in which the interesting points to be decided are: (1) Whether it is a case of purpura in which spinal cord hemorrhages are present, and is a painful elbow due to a local joint hemorrhage or to the spinal hemorrhage; or (2) is it a case of syringomyelia accompanied by its quota of sensory signs and joint conditions; and (3) what relation is there between syringomyelia and purpura?

¹ British Medical Journal, January 1, 1910.

² Journal of Nervous and Mental Disease, Lancaster, Pa., 1910, vol. xxxvii.

Benoit and LeClerc¹ report as a simple case of purpura one which resembles the Henoch type, occurring in a girl, aged twelve years, who sometime before had had a rather severe intestinal hemorrhage lasting for several days without apparent cause, and which was not accompanied by an eruption, and whose maternal history was suggestive of hemophilia. The onset of the present illness was acute, with severe abdominal cramps; later the involvement of left knee (swollen), and soon after the appearance of purpuric spots, but no ecchymoses. The course of the attack was a gradual recession of the purpura, with again its reappearance on two occasions, together with occult blood in the stools, the presence of which, the reporters claim, ran a parallel course to the eruption, becoming demonstrable again in the stools a short time before the appearance of a fresh crop of spots, the test increasing in positiveness as the eruption increased, and growing weaker as it faded.

The interesting association of *intussusception with Henoch's purpura* is again manifested by the reporting of several such cases, one of the most noteworthy being a case of Robinson's,² in a boy, aged five years, with initial swelling of several joints, followed by purpuric rash on the thighs. Five days after the onset he complained of abdominal pain, and blood and mucus were noted in his stools. The next day a lump could be felt below the navel. At operation, a large amount of blood-stained serous fluid (but no lymph flakes) escaped from the abdominal cavity, and a large intussusception was found with the intussusciptens much distended and dotted over with hemorrhagic points. No other hemorrhages were found in the bowel. The operation consisted in the resection of two feet five inches of intestine, end-to-end anastomosis, and recovery.

The question arose whether this was a clear case of Henoch's purpura, and, in the words of the reporter of the case, "The state of the joints, the intestinal hemorrhage, and the rash were pretty good evidence, and clinched by the association of enteric intussusception.

"Sutherland has stated that the hemorrhage into the wall of the bowel causes paralysis of that segment, and hence tends to intussusception. In this case there was no doubt that hemorrhage had occurred into the bowel wall, antecedent to the other changes, and the beginning of the marked blood staining was in the region of the apex of the intussusception."

Another interesting (but perhaps doubtful) case was reported by Collinson³ of a little boy, aged four years, with a negative family and past history. After a somewhat severe tax on the little fellow's strength, seven days before the reporter saw him, a number of purpuric spots had appeared on both legs, and a few days later abdominal pains and vomiting ensued, but bowel action was free and without blood. An

¹ Echo Médical du Nord, March 20, 1910.

² Lancet, October 1, 1910.

³ Ibid. March 12, 1910.

improvement in his condition followed; after an indiscretion in diet, a violent relapse occurred, with severe abdominal pains and vomiting, which later became fecal in type, and obstruction of the bowels. He was immediately operated upon by a right lateral abdominal incision, and a tumor mass of small intestine containing an intussusception was found in, and delivered from, the pelvis. The mass was excised and, on account of the patient's condition and to expedite matters, Paul's drainage tubes were tied in both ends of the gut and wound was closed. Rectal feeding with the injection of pancreatized milk through the tube into the distal gut was followed by improvement, and ninety-six hours later, at a second operation, the tubes were removed and an end-to-end anastomosis was done with celluloid sutures. Recovery and discharge in ten weeks. At the time of operation no bloody effusions were noted in the abdominal cavity and apparently the gut did not contain blood, so there may be some doubt as to whether this was a true Henoch's purpura.

PURPURA FULMINANS. A case of interest, but in which the diagnosis might be considered somewhat in doubt, was one reported by Rolleston and McCrerrick.¹ A boy, aged six years, with no family history of purpura or bleeding, was admitted to the Grove Fever Hospital at 10.30 P.M., on January 14, 1910, certified as suffering from hemorrhagic diphtheria. There had been a history of sore throat, headache, and vomiting ten days before admission. No cultures of the throat had been taken, and no antitoxin had been given. Between 4.30 P.M. and 5 P.M., on the day of admission, his mother had first observed a large bruise on the right thigh. Upon admission, an extensive blackish-red ecchymosis was seen on the outer side of the right thigh, and there was a similar lesion on the right buttock. The fauces were normal, but there were numerous carious teeth, with pus exuding from their sockets. The right submaxillary lymph glands were enlarged and tender. There was some indefinite desquamation on the trunk. Temperature, 100.4°. During the night and following day the ecchymosis rapidly spread, and death occurred at 3.30 P.M. on January 15, less than twenty-four hours after the first appearance of the purpura. Apart from a small area over the left elbow, the lesions were confined to the lower limbs. They were markedly tender to the touch, and were accompanied by edema of the feet and legs.

Death was preceded by extreme anemia, vomiting, restlessness, and a subnormal temperature. The mind remained clear until the end. No hemorrhages from any mucous membranes occurred. Dr. J. D. Rolleston said that this case exactly corresponded to Henoch's description² of Purpura fulminans in the extreme rapidity of the ecchymosis

¹ Proceedings of the Royal Medical Society, 1909-1910, vol. iii, p. 75.

² Berl. klin. Woch., 1887, vol. xxiv, p. 8.

formation, the entire absence of hemorrhages from the mucous membranes or in the internal organs, and in its rapidly fatal course.

At autopsy nothing was found beyond marked anemia of *all* the organs, and microscopic examination of sections of liver and kidneys were negative. The examination of the blood was as follows: Hemoglobin, 50 per cent.; red blood cells, 1,780,000; color index, 1.4; numerous microcytes; no normoblasts or poikilocytes; white cells, 57,000; polymorphonuclears, 63.4; small lymphocytes, 26.8; large mononuclears, 2.5; eosinophiles, 1; myelocytes, 6.3; mast cells, 0. 1000 cells counted.

Blood platelets were not increased. The serum was markedly hemolytic to normal human blood corpuscles in twelve hours in 1 to 50 dilution.

Streptococco-opsonic index, 2.31. At the autopsy the blood was found to be markedly fluid, and showed no tendency whatever to clot. A clot from the heart's blood resulted in the isolation of a streptococcus culturally conforming to streptococcus scarlatinae.

The reporters unhesitatingly reject the diagnosis of hemorrhagic diphtheria, and incline to the belief that the case was one of fulminating purpura following a possible scarlet fever infection.

TREATMENT OF THE PURPURAS. No advance during the past year has been made in the drug therapy of this group of diseases, and our present armamentarium still contains the long list of possible drugs, many of them proving as useless in one series of cases as they have been useful in another. *Calcium lactate* has been found more serviceable than calcium chloride. During recent years *serumtherapy* has been increasingly practised with success and, while the treatment heretofore has been especially directed to hemophilia, its benefits in other bleeding diseases has been urged. Welch,¹ in an excellent article, advocates the use of *fresh human serum* in place of animal serum. He calls attention to the symptoms which almost invariably follow the injections of animal serum; a condition that is known as "serum sickness," among the sequential symptoms of which are fever, erythema, wheals, edema, scarlatiniform and morbilliform rashes, swelling of lymph nodes, painful joints, etc. The frequency of serum sickness depends upon the amount of serum used, and a second injection produces more rapid and acute symptoms than the first dose, which has a sensitizing effect. This is the phenomenon which Richet calls *anaphylaxis*. In January, 1909, at the New York Lying-in Hospital, Welch first used human blood serum in a bleeding infant, of whose life the obstetricians had despaired. The child was completely exsanguinated; 50 Cc. of serum were injected in three days, in 10 Cc. doses, with recovery, and since then Welch has had 12 cases in all, all of which were cured of their bleeding sickness. He reports 9 of these cases in his article. These cases received from 10 Cc. of serum in one day to as high as 209 Cc. in five days.

¹ American Journal of the Medical Sciences, June, 1910.

Welch claims that serum sickness never follows the use of human serum, and, in fact, considers it harmless, and, in proof of this, he injected 150 Cc. of serum, removed from an eclamptic patient in convulsions (and who later died), into a normal adult without any subjective or objective effect. In addition to bleeding diseases, he advocates its use for tuberculous patients and in pyemia, and he reports a case of streptococcemia, in a practically moribund subject, in which 50 Cc. of serum was used, and twelve days later the patient was dismissed well.

Welch says: "As to the dose of serum to be used in any given case, it should be said that this depends upon the urgency of the case. One is apt to err on the side of too small doses. It is advisable to begin with at least 10 Cc. if the infant is bleeding only moderately. In severe cases it should be given every two hours, and in larger quantities if necessary. It is very important to begin the treatment at the first indication of bleeding, however apparently insignificant. I have used it in repeated small and large doses, also in single small and large doses, and am ready to state positively that it never gives serum sickness or causes anaphylaxis in the human subject. On the other hand, it is a perfect form of food, already digested and ready to be taken up and utilized by the tissues and cells of the body."

Class¹ reports a case of purpura hæmorrhagica in a woman who was given, in all, 11,400 units of *diphtheria antitoxin* (together with calcium lactate), with improvement for a month and then a severe relapse. The patient was then given 10 Cc. of fresh horse serum subcutaneously, and this time recovery was prompt and permanent, and ten months later the patient was reported in good health.

Nobecourt² reports a case of congenital hemophilia treated with the *Peptone of Witte*, made up as follows: Witte's peptone, 5 grams; sodium chloride, 5 grams; in distilled water, 100 Cc. The solution is then sterilized by heat to 120° for one-quarter hour.

The author's case was a child, aged nine years, who received in all 51 Cc. of the solution in twelve injections, in a dosage varying from 3 to 7 Cc., with intervals of time of from one to twenty-nine days. The results were good, allowing the extraction of a tooth during that period without accident; the child showed marked general improvement up to the time the case was reported.

Larger doses, 10 to 20 Cc., of the solution are apt to be followed by evidence of serum sickness, fever, chills, headache, nausea, increased pain, and a general erythema. The reporters claim that smaller doses of 3 or 4 Cc. do not produce any febrile reaction, and are sufficient to cause improvement. They say that the peptone of Witte "has been used in a great number of cases without losing its action or causing any accidents of anaphylaxis."

¹ Archives of Internal Medicine, August, 1910.

² Bull. et Mém. de Soc. Méd. des Hôp. de Paris, 1910, pp. 254 to 264.

It is yet an open question whether better results are obtained when the intervals of injections are longer or shorter. The reporters are satisfied that, in addition to the antidiphtheritic serum, the peptone of Witte, in subcutaneous injection, has shown a remarkable effect in congenital hemophilia and has given results when antidiphtheritic serum has failed. They have also used it in a case of purpura hæmorrhagica in which the petechiae, the intestinal hemorrhages, etc., were permanently checked. They state further that by rectal injections following the subcutaneous injection the therapeutic action may be prolonged.

Nolf¹ also advocates the use of Witte's peptone, or propeptone, in the treatment of hemophilia, giving it the preference over serum treatment in its action in increasing the coagulability of the blood, and he also recommends its use in the purpuras.

ADDISON'S DISEASE

Etiology and Symptoms. The question of etiology has occupied many of the observers whose papers have appeared during the past year, and the question is still open to argument. This diversity of opinion is not new, for it has arisen ever since the first description of the disease.

Kahn² reviews the theories as to the etiology of Addison's disease since its first description by Addison. He at first ascribed it to a lesion of the suprarenal gland, but in a later paper mentioned the sympathetic system as having a possible connection. Lesions have been found in both the central and peripheral nervous systems, as well as in the ganglia of the abdominal sympathetics, by several other observers. The question is still in doubt as to the primary lesion, as well as to which are secondary to it and which are merely the concomitant lesions to be found in any wasting illness.

Kahn calls attention to a number of cases of Addison's disease in which there has been a hyperplasia of the lymphatic system, as if in compensation for the involvement of the adrenals and the sympathetic system. This overgrowth has included the spleen, the follicles of the intestine, the lymph nodes, and, in a fairly large number of cases, the thymus gland.

Goldzieher³ has conducted some experiments upon the suprarenal gland, with a view to determining something as to the *adrenal content in certain diseases*. Of the cortex of the suprarenal, he says we are sure of nothing except that there are certain lipoid granules present in the cells which play some part in the functioning of the gland. The medulla we know, secretes the specific substance, adrenalin. This is found as

¹ Bull. et Mém. de Soc. Méd. des Hôp. de Paris, 1910, p. 434.

² Virchow's Archiv, vol. cc. p. 399.

³ Wiener klinische Wochenschrift, June 2, 1910, p. 809.

granules in the cells and is absorbed in the cell-bodies and even in the nuclei. It possesses the bronzing action through the chrome salts, the green coloration through iron chloride, and also a certain oxydase reaction.

Since the researches of Schur and Wiesel, it has been known that, under certain pathological conditions, such as nephritis, adrenalin is in the circulation in increased amounts. This has been found to be due to a hyperfunction of the gland. In most cases of nephritis the suprarenal can be shown to be hypertrophic, and in those in which the gland is not enlarged the amount of adrenalin was proved, by means of Zantfrognini's reaction, to be actually increased. Goldzieher has confirmed this fact, and has also found it to be the case with non-luetic arteriosclerosis. On the other hand, in Addison's disease and the different septicemias which are accompanied by a low blood pressure, the blood showed a low adrenalin content.

Bittdorf¹ reports 2 cases of Addison's disease *with amyloid of the suprarenals*, or *obstruction*, and *with hypernephroma* in 2 others. In 4 other cases the bronze pigmentation was explained by various other changes in the suprarenals. In some, the lesions were evidently of later date than the pigment, and had probably been preceded by functional disturbances.

The symptom of adynamia in Addison's disease brings into question the *relationship of muscular activity and the suprarenal function*. If we seek for further facts to prove this connection, the researches of Batelli and Boata² must not be overlooked. They state that the adrenalin of the suprarenal gland falls after strenuous muscular exercise. Schur and Wiesel³ arrived independently at the same conclusions by other methods. These facts refer to the sugar-producing action of the adrenalin, which is delivered to the blood from the suprarenal glands for the purpose of supplying the musculature with sugar. These same authors refer the adynamia of Addison's disease to a deficiency of this particular function of the gland. These facts and theories permit us to expect a decreased sugar content of the blood in Addison's disease, especially as Weiland⁴ was able to observe this decrease of sugar in the blood after strenuous exercise.

Porges⁵ estimated the *sugar content of the blood* in 3 cases of Addison's disease, and found them all below the normal limit of 0.07 to 0.09 per cent., set by Liefmann and Stern.⁶ Porges cases showed 0.052 per cent., 0.033 per cent., and 0.067 per cent. respectively. He considers that the

¹ Deutsches Archiv f. klinische Medizin, Band c, Nos. 1 and 2.

² Compt. rend. de la Soc. de Biol., 1902, vol. liv, p. 1203.

³ Wiener klinische Wochenschrift, 1907, p. 1202.

⁴ Deutsches Archiv f. klinische Medizin, 1908, Band xcii, p. 223.

⁵ Zeitschrift f. klinische Medizin, 1910, Band lxi, p. 341.

⁶ Biochemische Zeitschrift, 1906, Band i, p. 299.

estimation of the sugar content of the blood may be of value after we learn more exactly the normal low limit.

A relationship exists between these findings and those of Eppinger, Falta, and Rudinger,¹ and of Pollak.² The former observed, in cases of Addison's disease, an exceptionally high tolerance to sugar. This was noted in one of Porges' cases. Pollak noted that subcutaneous injections of 2 mg. of adrenalin in Addison's disease caused no glycosuria, while the same dose in other people regularly led to the appearance of sugar in the urine. Eppinger, Falta, and Rudinger,³ also showed that in dogs without the adrenals, phloridzin produced only a low degree of glycosuria. These facts seem to confirm Porges' experiments.

In order to confirm and round out the facts observed in Addison's disease, the sugar content of the blood of dogs whose suprarenals had been removed was determined. In all six of the animals employed the percentage of sugar in the blood was much lower after the double suprarenal removal, the decrease being from 0.131 per cent. to 0.461 per cent.

Porges rules out fatigue, cachexia, and shock of operation as factors influencing the reduction of sugar in either experiment. Laparotomy, venesection, narcosis, etc., tend rather to glycosuria than to hypoglycemia. In his opinion, his experiments put him in a position to deny that the hypoglycemia is independent of the symptom-complex known as Addison's disease and also of that following the removal of the suprarenals. On the other hand, he thinks that we are forced to regard this deficiency as due to the interference with the suprarenal function, or else to injury to some apparatus in close connection with it.

Cases of Morbus Addisonii have been observed with normal adrenals and lesions in the course of the sympathetics. In this connection, it may be true that the hypoglycemia, after adrenal removal, is due to lesions of these nerves rather than to the removal of the adrenals themselves. The glycosuria produced by the puncture of the fourth ventricle has been stopped by removal of the suprarenals, showing that injury to the fourth ventricle caused a stimulation of these glands by way of the splanchnics rather than that the ventricle itself had a direct hand in the production of the glycosuria.

There is a temptation to regard this deficiency of sugar in the blood as an explanation of the muscular weakness, but Porges' few therapeutic experiments with the administration of sugar did not give positive results in ergograph tests. Intravenous injection of sugar in dogs after removal of the suprarenals seemed to render them more lively, but this impression is scarcely enough to base scientific conclusion upon. At the same time, the research seems to demonstrate some connection

¹ Zeitschrift f. klinische Medizin, 1908, Band lxvi, p. 1; 1909, Band lxvii, p. 380.

² Wiener klinische Wochenschrift, 1909, p. 435.

³ Loc. cit.

between the proportion of sugar in the blood and the functioning of the suprarenals.

In a later paper, Porges¹ seeks to show that the muscular weariness parallels the exhaustion of the store of liver glycogen. In experiments on ten dogs, which were in a state of muscular exhaustion and whose suprarenals were removed, Porges found a greatly diminished glycogen content in the liver. Compared to the limits which Schondorff found in normal dogs, 7.3 to 18.69 per cent., Porges' figures of 0.0 to 0.788 per cent. with a high of 3.5 per cent., seem conclusive. That of the ether had nothing to do with the low figures is proved by the fact that Nebelthau has shown that narcosis leads to an increase of glycogen.

McGuigan² conducted some experiments along the same line as some of Porges, with somewhat different end results. He tested the urine of rabbits, dogs, and cats after adrenalectomy and the administration of sodium sulphate intravenously and phloridzin subcutaneously with the idea of producing a glycosuria. He summarizes his results as follows:

1. Removal of the adrenals in rabbits renders the production of salt glycosuria impossible, while phloridzin glycosuria occurs readily.
2. Removal of the adrenals in dogs makes the production of salt glycosuria difficult, but it can be produced.
3. Removal of the adrenals in cats does not seem to modify the production of salt glycosuria.

His experiments on rabbits, so far as salt glycosuria is concerned, are practically in accord with Mayer³ and Nishi.⁴ As to the production of phloridzin glycosuria, McGuigan's theory is that phloridzin disturbs the balance in the blood between the free and the combined sugar with the production of glycosuria, while sodium sulphate does not.

The different results obtained on dogs and cats on the one hand, and on rabbits, on the other, may be explained on the ground that the greater susceptibility of rabbits to shock, compared to dogs and cats, renders them less liable to glycosuria; or there may be accessory glands in the dog and cat and none in the rabbit. Whatever the reason, the facts shown by McGuigan should prevent us from accepting, as proved, the theory that in men the adrenals control the production of glycosuria.

Busch and Wright⁵ report 3 cases of Addison's disease, and give a partial record of a fourth case. In three of these, autopsies were performed, and in all of them, *tuberculosis of the adrenals* was found, though no particular part of the gland was described as being especially involved. Grünbaum, in *PROGRESSIVE MEDICINE*, June, 1908, is quoted as say-

¹ Zeitschrift f. klinische Medizin, Band lxx.

² American Journal of Physiology, June, 1910, p. 287.

³ Comptes rendus de la Société de Biologie, 1906, p. 1123.

⁴ Archiv f. experiment. Path. u. Pharm., 1909, vol. lxi, p. 401.

⁵ Archives of Internal Medicine, January, 1910, vol. v, No. 1.

ing that in the majority of his cases marked lesions of the medulla of the adrenal gland were found at autopsy.

Two of these three cases gave positive tuberculin reactions. In the third only the Moro was used, and it was negative. Anemia was not present in any case, hemoglobin varying between 74 per cent. and 100 per cent. and the red count between 4,040,000 and 5,400,000. Eosinophiles were present in every case, ranging from 2 per cent. to 19 per cent. In four out of seven counts, the leukocytes were between 10,000 and 12,850. In the other four counts they were below 9000.

All ended fatally. In the one case in which adrenal transplantation was performed, the operation was done on the testicle, because the condition of the patient did not warrant an attempt to use the kidney. The authors consider that the experiment justified a repetition of the procedure. One case which gave a positive Wassermann reaction was given antiluetic treatment, and his death was undoubtedly hastened by it. The intolerance for mercury was very striking.

The administration of adrenal gland, which was given in every case either by mouth or hypodermically, produced little or no benefit.

Love¹ reports a case of *complete absence of the adrenals*. The patient, a woman, aged fifty-two years, in September, 1902, noticed that her hands frequently became cold and discolored. In January, 1903, the joints of fingers and wrists became stiff and swollen. During April she suffered from pleurisy, and one month later noticed that the skin of the entire body was becoming darker. The abdomen enlarged and she discovered a slight discharge from the umbilicus. The skin grew harder and darker. The joints of the fingers and wrists became almost immovable and several of the finger-joints ulcerated, attended with a purulent discharge (Raynaud's disease). Under treatment with desiccated suprarenal extract immediate improvement was noticed. The ulcerated joints healed, pain in them ceased, and they became more limber. The skin softened and grew lighter. Improvement continued for about one year, when the patient complained that the powder disturbed her stomach and refused to continue the drug. From this time she grew gradually worse and the previously ulcerated, stiff, cold, and painful condition of the joints returned, associated with increased pigmentation and hardness of the skin. She died suddenly, and, at autopsy, no trace of the adrenals could be found.

Reisinger² reports a case of Addison's disease, seen by him in 1904, the diagnosis of which was concurred in by Drs. G. L. Magruder and Wm. Osler. The symptoms first suggested chorea, and the treatment usual in such cases was administered. In spite of this, the nervous symptoms grew worse, and the skin gradually took on an icteroid hue, with

¹ New York Medical Journal, January 29, 1910.

² Washington (D. C.) Medical Annals, vol. ix, No. 2, p. 131.

bluing of the scleræ. Emaciation was intense. No mention is made as to whether tuberculosis was found in any other part of the body. When the final diagnosis was made, the patient was given extract of suprarenal gland, one grain three times a day, together with symptomatic treatment. The return to health was gradual, and the improvement was coincident with the clearing up of the nervous symptoms.

One year after the attack the patient seemed in excellent health and weighed 165 pounds. After being under observation for six years in all, she is reported by Reisinger as follows:

" . . . Skin is only slightly tinted, sclerotics are white, and she is very strong, but whenever put to a severe nerve strain she has a return of slight twitching of the muscles of the face. . . ." This he controls by the administration of suprarenal extract.

Eiselt¹ reports two cases of Addison's disease which he had opportunity to study. The first was a male, aged thirty-six years, who died after a ten days' stay in the hospital. He showed pigmentation of the lower eyelids, both lips, oral cavity, neck, breasts, abdomen, and genital region. Otherwise the physical examination was practically negative. Autopsy showed caseous infiltration of both suprarenals, with a healed lesion at the right apex.

The second patient was a female, aged forty-two years, who remained fifty-five days in the hospital, and who left improved. She showed brownish pigmentation of the skin of the whole body, with darker spots around the eyes, in the mouth, on the linea alba, genitalia, arms, and legs. The physical examination was otherwise negative.

Concerning the functions of the different parts of the gland and the effects of organotherapy, Eiselt says that we can correct the lesions of the medulla, the secretion of which controls the tonicity of the musculature and the blood pressure, by the administration of adrenalin. Lesions of the cortex which, we are forced to conclude, normally exert an antitoxic influence and the destruction of which produces the symptoms of intoxication and pigmentation, are not improved by adrenalin medication.

Ness² reports a case of Addison's disease, and bases his diagnosis on (1) the characteristic deep pigmentation of the skin and buccal mucous membrane; (2) the progressive emaciation; (3) the slight degree of asthenia shown by lowered blood pressure and weakened heart sounds; (4) slight anemia; (5) symptoms of gastric disturbance at the outset.

Arsenic, and silver poisoning, malignant disease of the abdomen, Hanot's cirrhosis, bronzed diabetes, etc., were eliminated. No evidence of tuberculosis was found in the body. Calmette's test was positive. Von Pirquet's was negative.

¹ Zeitschrift f. klinische Medizin, Band lxi, p. 393.

² Glasgow Medical Journal, March, 1910, p. 180.

In discussing the *pathology* of Addison's disease, Ness says that the medulla of the gland supplies the adrenalin which has the power of stimulating the sympathetic system and, through it, of acting on the circulatory system. He thinks that Gray's statement that the medulla is of epiblastic origin, and is derived from the tissues forming the sympathetic ganglia of the abdomen, is significant in this regard.

MYXEDEMA AND CRETINISM

The two conditions, myxedema and cretinism, are so closely related that they will be included together in this discussion. Very little advance has been made in the last year in our general knowledge of either condition, with the possible exception that more of the mild or the incomplete forms are being recognized than ever before, and the symptoms relieved by proper treatment; this is due in a large measure to more careful and detailed examinations and observations, and to our slowly increasing knowledge of the functions and physiology of the thyroid gland.

As an introduction to further discussion on these subjects, some reference should be made to the brief summary of the history of our knowledge of the thyroid gland as set forth by Meltzer¹ in a paper on "Animal Experimentations in Relation to our Knowledge of Secretions, Especially Internal Secretions." He outlines the various steps by which we have arrived at our present ideas of the functions of the thyroid, and concludes with the following tribute to modern experimental medicine: "While the mere reasoning of many brilliant minds carried on for four centuries shed no light on the significance of the thyroid gland, the intense activity of modern experimental medicine managed to bring to light in less than ten years the following important facts with regard to these glands: (1) The thyroids are of fundamental importance to life and health; (2) a new disease was established; the "natural" atrophy of the thyroid in adult life leads to myxedema; (3) the real nature of a well-known disease was recognized; cretinism is infantile myxedema; (4) complete removal of goitrous thyroids during infancy leads to cretinism, and their removal during adult life may bring on either myxedematous cachexia or tetany; (5) surgeons learned two important lessons—on the one hand, not to perform a radical removal of the goitrous glands; and on the other hand, that the ill effects can be obviated by leaving behind a small part of the gland; and (6) extract of the thyroid gland is capable of removing the symptoms due to the natural or artificial absence of this gland."

The classification given by Kelly² is now generally accepted for this

¹ Journal of the American Medical Association, April 20, 1910.

² Practice of Medicine, 1910, p. 346.

group of diseases due to deficiency or absence of the thyroid gland: (1) Cretinism, or the congenital or acquired myxedema of infants and children, is characterized especially by imperfect development of the body and the mind; (2) spontaneous myxedema of adults, is characterized by myxedema, physical weakness, and mental deterioration; and (3) postoperative myxedema, developing after removal of the gland, and characterized by the same group of symptoms as given for spontaneous myxedema.

The exact functions of the thyroid gland have not been worked out as yet in a satisfactory manner. Osborne,¹ however, gives a brief summary of the specific activities of the thyroid gland, as understood today, as follows:

"A perfect secretion of the thyroid is necessary for the proper bone and mental development of the child, and the proper mental condition of the adult; for the proper relationship of the amount of fat to the rest of the body; for the proper health and functioning of the skin; for the proper health of the teeth, hair, and nails; for the proper menstrual and maternal functions of women; for the proper nitrogenous metabolism of the body; and for the prevention of nitrogen toxemias."

The gland is present and functioning at birth, and is most fully developed and active from the age of puberty to the age of forty-five years. Its secretion then begins to decrease until the gland atrophies in old age. It secretes, besides its internal secretion, a colloid substance which seems to be a storehouse for some of its activities. It especially acquires and stores iodine. Cretinism and myxedema are positive signs that the thyroid is hyposecreting, and from this lowest degree of under secretion to that of slight subnormal secretion occur all the varying symptoms due to a diminution of thyroid activity. The conditions caused by hyposecretion of the thyroid are obesity, adiposis dolorosa, sleepiness, mental apathy, dryness of the skin, chronic eczemas, digestive disturbances, slowing of the heart, increase in the blood pressure, and amenorrhea or scanty menstruation. Cretinism may also result from defective thyroid function in the mother.

Thyroid Inadequacy. French writers have for some time emphasized a group of conditions simulating myxedema, but in which an accurate diagnosis was difficult owing to the incompleteness or the mildness of the symptoms. One of the chief points of diagnosis in these conditions is the relief afforded by the administration of thyroid substances. Williams,² who has written several articles on subjects along this line, now states that, upon further investigation, he is convinced that much of this work is open to question on logical grounds, and that many of the so-called stigmata of thyroid inadequacy are in reality the signs of

¹ Journal of the American Medical Association, February 26, 1910.

² Clinical Journal, December 22, 1909.

insufficient action on the part of some of the other glands with internal secretions, notably the ovary, the adrenal, and the pituitary.

Normally, an equilibrium is maintained between the secretory activity of these glands through an antagonistic action between their secretions. If, now, we administer thyroid substance, we immediately stimulate the thyroid's antagonists. If, however, we increase the amount of substance given, we overwhelm these antagonists, so that much depends upon the dose of thyroid given. If good results follow the administration of a small dose, the good results are in all probability due rather to a stimulation of the thyroid's antagonists than to the supply of deficient thyroid. Large doses, on the other hand, when successful, argue either that the thyroid was deficient, or that the antagonists were overactive and had to be overwhelmed.

In regard to the *etiology* of this apparent thyroid insufficiency, he refers to acute febrile attacks, the result of the exanthemata or of influenza, tonsillitis, or acute rheumatism; these, he states, are liable to throw such a strain upon the resources of the thyroid gland that it is likely to remain exhausted for a long period thereafter. He points out that many of the symptoms seen during convalescence from many of the acute illnesses may, on rather good grounds, be placed under this group. He quotes the experiments of Watson, of Edinburgh, on the effect of an exclusive meat dietary upon the thyroid gland of rats. Watson found that the first effect of the meat was to stimulate the activity of the thyroid gland, but, if persisted in, to produce in the next generation a marked degree of thyroid degeneracy. From this he reasons that many of the cases of thyroid insufficiency today may have as a cause the over ingestion of meat by our forefathers.

As one of the manifestations of this hypothyroidism, he refers to chronic alcoholism. These patients are below par, and want stimulating. Alcohol in small doses, like meat foods, stimulates the thyroid. These individuals soon come to recognize this effect, and the craving is increased. There is later depression of the thyroid with the increased amount of alcohol, and intoxication results. On this subject he makes the following generalizations.

1. "Subthyroidic people generally dislike alcohol because they fear its effects, and, if they take it at all, they tend to take it to excess.
2. "People with a normally acting thyroid generally like alcohol, but they are almost invariably very temperate in its use.
3. "Hyperthyroidic people rarely take alcohol at all, and, when they do, it is generally in very small quantities.
4. Dysthyroidic people enjoy alcohol, and very readily take it in excess."

As contraindications for the administration of thyroid extract he mentions tuberculosis, malignant disease, and glycosuria.

Kutschera¹ reports an interesting case of the transmission of cretinism from humans to animals. He found two dogs with every sign of cretinism which were brought up in the bed with a pauper and her cretin children. Another dog was given the family, and, after sleeping in the same bed for nine months, developed typical cretinism. Another normal dog given to the family at the same time, but too large to be taken into bed, did not take the disease, although he slept in the same room. Kutschera seems to be firmly convinced that cretinism is most liable to develop in small, dirty homes, among people who are lacking in a sense of cleanliness and who are exposed to frequent or intimate contact with cretins in early childhood.

Symptoms. Jones² gives a very good summary of the symptomatology and treatment of cretinism, and of juvenile and adult myxedema, and lays stress especially upon the recognition of the early signs of these types as pointing to mild or incomplete forms of this disease.

Hypothyroidism may be the cause of a series of different symptoms or conditions differing widely from the classical picture of myxedema, for the final recognition of which the therapeutic test may have to be relied upon. Pitfield³ states that the condition may be so mild as to cause a few pains and aches, or so severe as to render the victim a bed-ridden neurasthenic invalid, ugly and miserable, and often a complete puzzle for the medical attendant. Myxedema is not necessary for the diagnosis. The patient may be so far advanced in the disease that the atrophic form is present, with emaciation and cachexia so extreme that no subcuticular tissue, save bones and muscles, remain. Or the disease may be so mild that no skin manifestations are present and yet have so many nervous symptoms as to be very miserable and regarded as a neurasthenic crank.

Pitfield has seen nine cases in private practice. One patient was very myxedematous; two were merely fat-looking, with puffy faces and swollen eyelids; one was a cachectic, prematurely old, and withered-looking woman who had been an invalid for years, and in whom there was very little to suggest myxedema; two were comely, handsome women, one aged thirty-five years, and the other aged fifty-three years; another was a thin, nervous little woman, a familiar type, with many ills and no myxedema.

All had several things in common, all had children, all had joint pains which had been regarded as rheumatic, the fat ones were all thought to have nephritis, the thin ones nervous prostration, and all had had a number of physicians who had misdiagnosed their ills.

He believes that any woman approaching middle life, or in the fourth decade, who has had a history of backache, an occipital headache,

¹ Wiener klinische Wochenschrift, November 10, 1910.

² Virginia Medical Semi-monthly, July 22, 1910.

³ New York Medical Journal, August 27, 1910.

together with joint pains, dyspnea, and asthenia, should be suspected of having hypothyroidism, especially if she has amenorrhea or had had it during her menstrual life. The administration of thyroid extract in these patients was found to be of considerable benefit.

Siegmund¹ calls attention to certain cases of *defective functioning of the thyroid gland, in which there is an inordinate craving for sugar*. He describes two cases in detail, one in a boy under two years of age, the other a girl aged nearly six years. In both cases, the administration of thyroid extract restored conditions approximately to normal. These cases emphasize the fact that the thyroid plays an important part in the sugar metabolism in certain cases. These patients tolerate large amounts of sugar without the appearance of sugar or albumin in the urine. If thyroid treatment is not practicable, they should be allowed all the sugar they crave, as it seems to mitigate the consequences of the thyroid insufficiency and seems to be a defence in a certain form of thyroid weakness. The older child had suffered for years from severe diarrhea and was extremely debilitated. After treatment both cases were absolutely changed. He sometimes gives suprarenal juice in the place of the thyroid extract, finding that this advantageously supplements the other.

A case of considerable interest, on account of the *association of adiposis dolorosa and myxedematous manifestations* in the same patient, is that reported by Stern.² The patient was a native of Roumania belonging to the Hebrew race, aged forty-two years. She was perfectly well until four years before examination; then she slowly began to grow fat, and soon reached the weight of 224 pounds. For the year before the examination, she noticed progressive weakness, palpitation, and shortness of breath upon slightest exertion. She had non-pitting edema of face, legs, and feet, and suffered with paroxysms of pain in the legs, but especially in the calves and posterior portion of the thighs. For two years her perspiration had been considerably reduced. Physical examination revealed an apathetic, bloated woman, generally well developed, with large deposits of fat over the abdomen, shoulders, and back, and with smaller masses over the legs; the latter were distinctly painful upon pressure. The skin was rough, rather firm, and inelastic. The blood pressure was 90 mm. of mercury by Potain's instrument. The reflexes were diminished.

She was placed on an anti-obesity diet, thyroid medication, and physical therapeutics, especially vibratory massage and exercise. Eight months later she felt strong and able to walk from five to eight miles a day; she had lost her dyspnea, perspired mildly when walking briskly. The fat bunches have disappeared almost entirely, while the neuralgic pains ceased after four months' treatment. She had not the slightest

¹ Deutsch. med. Wochenschrift, May 26, 1910.

² American Journal of the Medical Sciences, March, 1910.

mental depression or apathy, and her weight was 161. The case illustrates the relation of adiposis dolorosa and myxedema to each other, inasmuch as either disease may be caused by an insufficiency of the thyroid gland.

Ehrenberg¹ reports an unusual case presenting the symptoms of *incomplete myxedema associated with those suggesting Raynaud's disease*. A woman, aged fifty-six years, had had, for more than ten years, recurring attacks of local syncope and asphyxia in the hands and feet, accompanied by dryness of the skin, subnormal temperature, and other indications of myxedema. She was much benefited by thyroid treatment. The case is the only one he knows of which suggests a thyroid origin for the vasocontractile phenomena first described by Raynaud. In curves representing the peripheral temperature, especially of the hands, in this case and also in twenty-six healthy persons for comparison, he demonstrates the marked variation in his case.

As illustrative of certain other unusual manifestations seen in cretinism Manson² reports the cases of two male twins, B. H. and O. H. They were both wet-nursed until sixteen months of age, began to walk and talk at the proper age, and appeared to be perfectly normal in every way except that they were extremely fat. B. H., when aged eleven years, while playing out-of-doors, suddenly became unable to walk, and had to be carried home, where he was kept in bed for two weeks. There was associated with this inability to walk considerable pain about the hips and thighs, which troubled him occasionally. Two years later his gait became wobbling, the body swaying from side to side; this is manifested at the time of the report ten years later. He also began to have spells of unconsciousness, with tonic and clonic spasms and frothing at the mouth; these became more and more frequent until in October, 1906, they had become almost a daily occurrence, were both nocturnal and diurnal, some severe, while some were mild and of very short duration, suggesting attacks of petit mal, besides the seizures of grand mal.

The other twin, except for being very fat, showed nothing abnormal until fourteen years of age, when he also developed a staggering gait and complained of severe pains about the hips. He was treated by means of an extension apparatus, but without any improvement; the staggering gait remained the same, and later had associated with it a similar unsteadiness of the upper extremities, so that he had considerable difficulty in using his hands to write.

Both boys were slow to acquire knowledge at school; in both, the hair of the scalp became thin and sparse, while on the rest of the body the growth of the hair was excessive. The thyroid gland in both boys was so rudimentary as to be scarcely perceptible and difficult to map out.

¹ Upsala Läkaref Förhand, N. S., No. 3, p. 127.

² New York Medical Journal, January 1, 1910

Manson regarded them as cases of cretinism with unusual manifestations and began the administration of thyroid extract in gradually increasing doses. Considerable improvement resulted in both boys, less, however, in B. H., although his epileptic seizures were greatly modified. It was impossible to trace out any cause for the thyroiditis.

Treatment. Herrick,¹ in discussing the treatment of myxedema, cretinism, obesity, infantilism, and goitre, summarizes the physiological action of *thyroid extract* as follows: It accelerates the heart action, giving rise to the palpitation so often complained of by patients suffering with hyperthyroidism. Myocardial weakness, with low blood pressure, follows and may become extreme after long-continued or massive dosage of the extract. The loss of weight is due in part to increased oxidation of fat, to increase in the amount of water eliminated, and to the rapid destruction of proteids. Unless large amounts of nitrogenous foods be taken, the nitrogen loss through the urine and feces may exceed the nitrogen intake. Increased metabolic activity is further shown by the increase in the output of oxygen and phosphorus. In large doses, the temperature becomes elevated, there is a tendency to looseness of the bowels, the skin flushes easily, may itch, and sweating is common. Nervous irritability of the nervous system is seen in insomnia, mental unrest, anxiety, emotionalism, tremors, and weakness. There is often a relative lymphocytosis.

The use of the various thyroid preparations, at one time so general for so many vague symptoms, is now being restricted to those cases showing some real sign of thyroid insufficiency. Stern² decries the general use of these substances by patients without the advice of a physician. Many such cases are made worse instead of better. Again, different individuals are differently affected by the thyroid preparations. In a certain class of patients the ingestion of thyroid extract is followed by loss of body weight and general improvement; in another class, there ensues loss of body weight, with concomitant depression and toxic symptoms, and in a third class there occurs no, or very little, loss of body weight, but very vague toxic phenomena. Individuals of the first class usually exhibit ill-pronounced myxedematous manifestations.

In the use of thyroid extract, insistence must be made that the use of large doses is only warranted in special conditions, and then only for a limited time. For the successful coping with nearly every phase of the chronic conditions in which there exists thyroid insufficiency, the employment of small doses will do effective work in the great majority of instances. He also advises the associated use of arsenic with the thyroid extract, on the ground that "the human thyroid contains about sixteen times the amount of arsenic than does that of the sheep which we employ for medication."

¹ Illinois Medical Journal, March, 1910.

² American Medicine, January, 1910.

The use of thyroid extract in typical cretinism and myxedema is usually followed by very marked beneficial results; these are so well recognized today that repetition seems hardly necessary.

Stoeltzner¹ emphasizes the *advantage and the difficulty of the early recognition of myxedema in children*. Many of these cases are treated under the assumption that they are rachitis, and, as the prospect of a cure is less and less with the duration of the disease, valuable time is often lost. He reports several cases. One was the case of a boy, aged six years, who had not grown in the last two years, and, although not particularly bright, seemed otherwise normal. Under careful thyroid treatment for eighteen months, he had grown 11 cm. In two other cases the myxedema had developed after severe measles or mumps, with acute thyroiditis in the latter case. The thyroid treatment ordered was soon abandoned by the family, and the child developed pronounced myxedema, but after two years it spontaneously subsided. In a fourth case the myxedema developed after a severe fall over a balustrade, the throat in front bleeding from the injury. Hypothyroidism followed the accident, and was promptly relieved by thyroid treatment. In conclusion, Stoeltzner suggests that "pasty," fat, pale, and flabby children may be suffering from hypothyroidism and require thyroid treatment. Overfeeding of children with this tendency to hypothyroidism seems to entail lymphatic enlargement.

Reference was made, in PROGRESSIVE MEDICINE, June, 1910, to the work of the Austrian Government toward the relief of cretinism and to the good results obtained up to that time. Sofer² makes a further report this year. He states that there are known to be 17,286 cretins in Austria, about 64 to each 100,000 inhabitants, and 1011 have been systematically kept under thyroid treatment. The cretins use the thyroid tablets at home. Certain regions where there were many cretins fifty years ago seem to be free from the tendency now. On the other hand, others, formerly free from it, now have many examples. Italy has recently taken up a similar work.

BANTI'S DISEASE.

The papers of the year show a marked tendency among authors to disagree as to the seat of the primary lesion, and also as to the cause. The original describer of the disease, whose opinion should bear weight, has definite ideas on these subjects and also on the importance of the various symptoms, but he finds many who dissent from his views.

In an article translated from the Italian by Robert-Tissot,³ Banti

¹ Jahrbuch für Kinderheilkunde, August, 1910.

² Therapeut. Monatsschrift, November, 1910.

³ Folia Hematologica, September, 1910, vol. x, Part I.

points out the following characteristics of the pathological entity bearing the name of *primary or cryptogenic splenomegaly*: (1) A regular and uniform swelling of the spleen which may reach a weight of $\frac{1}{3}$ to $\frac{1}{2}$ kg. (2) This enlarged spleen is, as far as can be determined, the initial feature of the disease, and, as such, has no recognizable cause. (3) The lymph glands show no changes. (4) The spleen in this form of splenomegaly does not show any of the histological changes of leukemia, nor does the blood take on any leukemic characteristics.

The name of primary or cryptogenic splenomegaly embraces a great number of pathological entities of widely different clinical, pathologico-anatomical, and probably etiological, characteristics. The group of cases known as "splenomegaly with liver cirrhosis" now goes under the name of Banti's disease. In order to encourage reports of cases of true Banti's disease, and to enable observers to distinguish between it and a number of other conditions, Banti quotes from at least 60 cases which, either by operation (splenectomy) or by autopsy, have been proved true cases of Banti's disease.

Etiology. The youngest case was aged twelve years, the oldest, fifty-five years. The cases were divided, 64 per cent. women and 36 per cent. men. No history of previous diseases could be elicited with anything like uniformity, and there is an especial absence of any history of gastric disturbance, diseases of the liver and bile passages, malaria, and syphilis. Alcohol and errors of diet could be excluded. There was no family or regional grouping of cases.

Symptoms. The disease is always chronic, and lasts over many years. Banti divides it into three periods:

Period 1. The onset is gradual, and the first symptom may be a sense of weight or tenderness below the left costal margin. The spleen gradually increases in size, extending downward toward the edge of the pelvis and even across the middle line of the body. By the time it reaches this size, or before, it stops growing, with only slight fluctuations in size, coincident with the remissions or relapses of the disease. The symptoms that follow are those of a simple anemia; pallor, weakness, dyspnea, cardiac palpitation, and hemic murmurs. If the anemia is severe, edema is present around the ankles. Fever is often present, either of the low, continued type, or with sharp rises. The anemia may be very severe, with the hemoglobin down to 50 per cent. or even 30 per cent.; it may occur late in the disease and be much less severe, or it may be altogether absent. In the latter case, the subjective symptoms of anemia are often present, due probably to a splenogenous neuromuscular poison. Gastro-intestinal disturbances are usually not present. Appetite, digestion, and the bowels are normal. The liver shows nothing abnormal as to size, tenderness, or function. There is no jaundice, ascites, or establishment of a collateral venous circulation through obstruction to the portal system. As far as the urine is concerned, urea and

uric acid are present in normal amounts; there is no albumin, sugar, bile pigment, or urobilin. The lymph glands are not enlarged, and symptoms suggesting a hemorrhagic diathesis, present in leukemia, and a leukemic involvement of the lymph nodes, are so rare as to be negative. This period usually lasts from three to five years.

Period 2. This is characterized by changes in the amount and quality of the urine. The daily quantity falls below a liter, and contains urobilin. The liver becomes enlarged, smooth, and not tender. Ascites and jaundice are absent. The skin and conjunctivæ are a grayish-yellow color. The feces have their usual color. Dyspepsia, diarrhea, and hemorrhoids occur rarely. The other symptoms do not change much. The liver increases in size, but with the approach of the third period it diminishes somewhat. The second period varies from eighteen months to several years.

Period 3. This is distinguished by the painless, afebrile appearance of the ascites. The fluid is clear and lemon-yellow in color, and shows all the signs of being a transudate. It recurs quickly after puncture. The liver grows smaller and retires beneath the costal margin. The spleen remains the same size. The urine is lessened still further in amount, is rich in urates, and the specific gravity is raised. The urea content is diminished. There is no albumin, more or less urobilin, and, at times, traces of bilirubin.

There is no real jaundice. The skin is earthy-brown, the conjunctivæ are pale yellow, as in alcoholic atrophic cirrhosis of the liver. Hemorrhages, which are rare in the first period, are observed here, especially from the stomach and intestines.

Hematology. The color index is, in the great majority of cases, low. In some cases there is a polycythemia, in others the red cells are normal in amount, and in still others there is a paucity of red corpuscles. The grade of the anemia bears no relationship to the severity of the disease. The proportion of white to red cells is normal.

If the anemia is slight, the size and the form of the erythrocytes is normal. With an extreme degree of anemia, poikilocytosis, anisocytosis, and even microcytosis occur. Nucleated reds are absent, and polychromatophilia is rare. The leukocytes never rise above 10,000 per cubic millimeter, and are usually decreased. In the higher counts, the neutrophilic leukocytes and the mononuclear leukocytes are increased in percentage. In the lower counts, the neutrophils and the lymphocytes are decreased, while the mononuclears show a tendency to increase. Myelocytes are never found.

Pathological Anatomy. The most important changes occur in the spleen, liver, and the splenic and portal veins.

SPLEEN. The changes in the spleen do not differ much in the three stages, probably the entire change occurring before the spleen becomes large enough to attract attention. It consists chiefly in an increase in

the number and size of the reticular fibers, without much change in the cellular element. He terms it "fibro-adenoid" (Fibro-adenie, fibro-adenisch), because of its reticular or adenoid appearance. This seems to be due to a chronic irritation of the lymphatic elements rather than a result of a pure chronic inflammation with consequent formation of embryonal tissue.

LIVER. In the second and third periods, the liver cannot be differentiated from the liver of Laennec's atrophic cirrhosis, either microscopically or macroscopically. In the first period, it is practically normal. There is no siderosis.

VEINS. Through all three stages the intima of the splenic and portal veins has undergone, at different points, a chronic sclerotic endophlebitis.

Bacteriology. The peripheral blood, an extract of splenic pulp obtained during life by puncture, the spleen removed after operation, the blood of the splenic vein, and the bone marrow of fatal cases were all examined for bacteria or other parasites. Sections of the spleen, liver, and bone marrow were hardened, stained and examined. No bacteria or parasites could be found. Aërobic and anaërobic cultures were made on different media with no result. Guinea-pigs, rabbits, dogs, and rats were inoculated subcutaneously, intraperitoneally, and intravenously with the blood, extract of spleen, liver, and bone-marrow. Sections of liver, spleen, and bone marrow were inserted under the skin and in the peritoneal cavity. Small pieces of splenomegalic spleen were implanted in the spleens of dogs. All this was fruitless. As a result, one can only say that Banti's disease is not due to a known microörganism. Banti, however, believes it to be of an infectious nature.

Pathogenesis. Banti has elaborated a theory explaining the pathogenesis and course of the disease, as follows: He believes that the disease is due to an unknown infectious agent which localizes itself first in the spleen. It appears not to act in an inflammatory manner, as it causes neither exudate nor a granulomatous condition. In the reticulum, it causes the fibro-adenoid appearance described above. In the pulp and in the follicles, it causes pure degenerative changes. Since the changes in the reticulum are more severe, more constant, and more widespread than in the cells, and since they are most severe around the fine ramifications of the arteries, one is justified in supposing that the lesions in the spleen begin in these spots, the agent being carried by the arterial blood stream.

In the spleen, certain poisons are elaborated, among which he mentions two: Toxins due directly to the causative agent; and poisons (splenotoxins) formed by disturbed splenic metabolism. According to our present knowledge, both suppositions are equally tenable. Banti prefers the first.

He explains how, theoretically, the anemia, the weakness, the cir-

rhosis, and the change in the veins could be produced, and is convinced that his hypothesis is the correct one.

Paulicek,¹ however, in the report of a case of primary chronic splenomegaly, comes to rather different conclusions as to the nature of the disease described by Banti and bearing his name. His case is that of a girl, aged seventeen years, showing, at the time of admission, signs of infantilism. Family history was negative. The patient went to school and did not seem backward in her mentality. Except for an attack of hematemesis and a tendency to nasal hemorrhage, the previous medical history was negative. She was sent to the clinic in March, 1908, on account of the exceptional lack of growth and development.

Patient was not especially pale, nor was there any emaciation. There was no superficial glandular enlargement. Lungs were negative. Except for a soft systolic murmur heard at all the valve points and not transmitted, the heart was normal. The liver extended in the right parasternal line three fingers' breadth below the costal margin. The spleen was much enlarged, extending to the left parasternal line and down to within one finger's breadth of the anterior superior spine of the left ilium. There was no tenderness in the abdomen, nor was there any free fluid. In the urine, there was no albumin or bile-pigment. Urobilin and urobilinogen were positive. The blood showed 5,528,000 red cells; 70 per cent. hemoglobin; color index, 0.64; leukocytes, 1950. A differential count of the leukocytes showed polymorphonuclears, 58 per cent.; eosinophiles, 2.8 per cent.; mast cells, 0.4 per cent.; lymphocytes, 22.2 per cent.; large mononuclears, 16.2 per cent. Moderate anisocytosis, no poikilocytosis, no pathological cell forms, no normoblasts, no malarial organisms.

During the three months after admission, on indifferent treatment, the patient improved as regards her strength and feeling of well-being, but developed a gradually increasing anemia with an accompanying rapidity of the pulse. The liver and spleen remained the same. About this time the patient began to feel weaker, and the temperature began to rise slightly. There was tenderness in the abdomen, and evidence of free fluid. At this point she was turned over to the surgical department. The leukocytes had continued low, but the reds had decreased to 1,794,000 and the hemoglobin to 20 per cent. There was anisocytosis, polychromasia, and poikilocytosis, with a few nucleated red cells.

A splenectomy was performed, and the patient was discharged after ten months further treatment. A histological examination of the spleen showed a connective-tissue overgrowth of the reticulum and the presence of a number of endothelioid cells, with suppressions of the normal splenic parenchyma. There were also groups of epithelioid and giant cells which corresponded in every way to tubercles. Tubercle bacilli were not found, and a tuberculin test was not made until later.

¹ *Folia Hematologica*, June, 1910, vol. ix, Part 3.

Paulicek notes the divergent views which different observers take regarding the pathology of Banti's disease, among them that of Marchand that splenomegaly, considered as a severe blood disease, could not lead to secondary liver cirrhosis, and that the enlarged spleen of Banti's disease is a sequel of a primary liver disease, or else a late stage of a congenital syphilis. Baumgarten, Hochhaus, and Chiari agree in part with him. Hirschfeld, Hedenius, Edens, and von Neusser all propound explanations which do not agree with Banti's ideas.

Paulicek thinks that the histological examination of the spleen gives evidence of an inflammatory process, and that this is quite proper in view of the signs of tuberculosis present. He is not prepared to say that tuberculosis in this case is the cause of the inflammatory reaction; it may be an accidental or added infection. But he disagrees with Banti, who claims that the fibro-adenoid condition does not rest on the basis of a chronic inflammation.

As regards the liver cirrhosis, he thinks that the fact that there was an inflammatory condition present in the spleen could not be considered proof that the liver changes were also inflammatory. Banti's theory disregards the inflammatory origin, but Paulicek points out the fact that they could be due to such a cause. In this, he is supported by the views of a number of observers.

Following the operation, in Paulicek's case, there developed a hyperplasia of the lymphatic apparatus of mild grade, which corresponded to the return of the small lymphocytes to normal. Czerny, Kocher, Ceci, Krabbel, and Pflüger, among others, observed the same in their cases.

The improvement in the general condition of the patient, following splenectomy, was marked and rapid, and was accompanied by the onset of menstruation which had not yet taken place. Appetite, bowels, and urine were normal, and hemorrhages ceased at once. The lungs were normal. The heart showed an accidental systolic murmur. The liver remained palpable. A Wassermann test, done at this time, was negative. A subcutaneous tuberculin test gave a negative result, as did also the ophthalmo-reaction. A cutaneous test with a 25 per cent. solution was positive. Some months after the operation a hernia developed at the site of the scar, and a radical operation was performed for its relief. A walnut-sized nodule was found in the abdominal cavity and was removed. Upon examination, it was found to be an accessory spleen.

As regards the infantilism, Paulicek does not attempt to establish a connection between it and the splenomegaly, although it is possible that directly or indirectly such a one may exist. He contents himself with remarking that infantilism has been noted as an accompaniment of Banti's disease by Banti, Umber, Müller, and others.

Although Naunyn, in 1904, defined Banti's disease as a common cirrhosis, characterized by an exceptional splenomegaly, a hemorrhagic

diathesis, and anemia; and Simmonds, in 1905, declared that there is nothing peculiar or pathognomonic in the histology or autopsy findings, Luce¹ thinks that the results of splenectomy warrant the belief that it is a separate entity. In support of this, he quotes Umber's² case, a boy, aged fifteen years, who showed splenomegaly, anemia, and enlargement of the liver. A piece of the liver, removed during splenectomy, showed unmistakable periportal infiltration. The liver resumed its normal size shortly after the operation. This seems to Luce to prove the truth of the assertion that the spleen is the source of the inflammatory liver infiltration which manifests itself in the early stage of the disease. Umber found that, as a result of metabolic examinations made on this patient, an exceptionally increased albumin destruction of toxic origin was present.

Banti's disease in the third stage is not difficult of diagnosis, but it is different in the first and second stages, *i. e.*, when only splenic tumor and anemia are present, and icterus, urobilinuria, gastro-intestinal symptoms, hemorrhages, and ascites are absent. The work of Gretscl and Strümpell fastened the name splenic anemia to these cases without meaning to intimate a causal relationship between the anemia and the spleen. This was discussed by Banti in his work on the subject, and since then the question has been raised as to whether the splenomegaly and anemia of infants and young children is not a form of Banti's disease.

Southerland and Burghard,³ in their paper on splenic anemia, deplore the lack of definiteness which formerly surrounded the term. They quote Rolleston, who has summarized the symptoms of splenic anemia, or primary splenomegaly, as follows: (1) Anemia of the chlorotic type. (2) Usually a leukopenia. (3) Cryptogenic splenic enlargement. (4) The prolonged nature of the disease. (5) Tendency to gastro-intestinal hemorrhage from time to time. (6) Termination of the case, if sufficiently prolonged, in hepatic cirrhosis with ascites (Banti's disease).

The authors note that some other observers do not agree on the prolonged nature of the disease; that the occurrence of hemetemesis is not universally noted, and that the termination in Banti's disease seems open to question as regards the majority of cases. The first three of the above criteria are the essential features of the disease, and the authors hope to add a fourth—namely, improvement after splenectomy.

In two cases of splenic anemia in children, in both of which all known causative factors had been eliminated, splenectomy was followed by prompt improvement and the disappearance of all signs and symptoms of the disease.

The authors mention the failure, on the part of observers, to find any

¹ Medizinische Klinik, Band vi, Nos. 14 and 15.

² Zeitschrift f. klinische Medizin, Band lv.

³ Lancet, London, December 24, 1910.

evidence as to the nature of the disease. A theory which they tentatively propound, an analogue of which may be found in the disturbed function of the thyroid in Graves' disease, is a loss of vasomotor control in the splenic artery. No theory as to this loss of control is mentioned. It could lead to overfilling of the spleen with arterial blood, with an enlargement of the spleen, and, as a result, all its substance—Malpighian corpuscles, endothelial cells, connective tissue, etc.—would be hyperplastic. The endothelial cells, which normally do the scavenging work of the spleen, would, in increased numbers and with added powers, cause an active hemolysis. The increased amount of arterial blood going to the stomach through the splenic artery could cause gastric hemorrhages. If this theory is accepted, the operation of splenectomy seems, to the authors, to be fully justified.

Peude¹ claims that there is no clinical entity that can be called splenic anemia. A primary anemia may be accompanied by a primary splenomegaly. The anemia may be of the Banti, the Biermer, the progressive pernicious type, the leukanemic type, or the type of infantile splenic anemia described by Cardarelli, while the enlargement of the spleen may be of several different varieties. There is not necessarily any connection between the anemia and the splenomegaly.

Treatment. Medicinal treatment of Banti's disease has proved absolutely useless to work a cure, though iron and arsenic give improvement. X-ray is no better. Splenectomy early is the only treatment that does any good. In the first stage, the anemia and asthenia disappear, the cure is complete, and there is no return. In the second stage, the anemia and weakness disappear and the liver cirrhosis ceases to progress. In the third period, the simple splenectomy, or splenectomy and the Talma operation, or splenopexy, were attempted. In cases in which the operation was survived, the patient went on to a cure.

The result of splenectomy in the cases reported by Banti² were as follows:

	Own Cases.		Collected Cases.	
	Cases.	Cures.	Cases.	Cures.
First period	2	2	2	1
Second period	6	5	16	8
Third period	2	0	2	1

After splenectomy and the Talma operation, there were 2 cures out of 4 cases. Splenopexy was followed by cure in 2 cases.

Momm³ reports a typical case of Banti's disease with history of having been run over by a bicycle. He was apparently cured by removal of the spleen four years after the onset of symptoms. Ascites occurred early in the course of the disease. Momm thinks that this is due to

¹ Loc cit.

² Policlinico, Rome, June, 1910, No. 6, Medical Section.

³ Deutsche medizinische Wochenschrift, April 28, 1910, Band xxxvi. No. 17.

the abnormal composition of the blood and to the obstruction of the lymphatics owing to the swelling of the mesenteric and retroperitoneal lymph nodes.

Lerch,¹ in his report of a case, is inclined to regard splenectomy favorably. The patient was a woman with a doubtful history of malaria. After two years of symptoms pointing toward a general intoxication, there was noted enlargement of the spleen, large liver, and ascitic fluid in the abdomen. It was impossible to tell whether the liver or spleen was the first to enlarge. The condition was marked by its chronicity and its remissions. Lerch first saw the case nine years later, and noted that the face, back of hands, and forearms were covered with large bronzed spots; the finger-nails, lips, and mucous membranes were pale. The scleræ were slightly icteric, the tongue was coated, and the teeth were in good condition. The heart was normal, except for a hemic murmur. Erythrocytes, 4,000,000; hemoglobin 60 per cent. Ascitic fluid could not be demonstrated.

SPLENOMEGALY

Judging by the work of the past year, there seems to be a growing tendency on the part of observers to avoid the term splenomegaly, and to substitute for it one which means more from either an etiological or pathological standpoint. The more closely the subject is studied, the greater is the inclination to place the cases which formerly came under this category in certain other more or less well-defined classes.

Hess,² in his article on diseases accompanied by enlargement of the spleen, says that those diseases which show a high-grade polymorphonuclear leukocytosis, in which, therefore, the toxin attacks the bone marrow, as a rule present no appreciable splenic enlargement nor any general involvement of the lymph nodes. Examples of this are erysipelas, and croupous pneumonia. On the other hand, certain affections, such as lues, malaria, and typhoid, attack at times the lymph glands and again the spleen, and lead to no increase and often to a diminution of the bone-marrow element in the blood. This seems to point to a certain functional independence of the lymphatic tissue on the one hand, and of the bone marrow on the other. He finds that every case showing involvement of the spleen shows either some alteration in the red cells, or in the white cells, or both, and he makes an effort to formulate rules by which we can, from the blood examination, judge of the condition of the spleen.

In his revision of a number of cases he finds that a goodly share of primary and secondary tumors of the spleen are accompanied by a white blood count of less than 5000—a leukopenia. As a rule, this occurs in

¹ New York Medical Journal, April 9, 1910.

² Wiener klinische Wochenschrift, February 17, 1910, p. 243.

cases in which the enlargement of the spleen dominates the picture, as in splenomegaly, or where the enlargement is the most prominent symptom, as in Banti's disease, or tertiary lues. The swelling in these cases is usually large, reaching to the symphysis or to the umbilicus, such as we are accustomed to see only in splenomyelogenous leukemia or in tropical malaria. As opposed to leukemic tumors, they are very hard, and perisplenitis is not very often seen. The enlargement of the liver, when demonstrable, is less than that of the spleen, and the symptoms indicate, as a rule, no interference with liver function. In the case of splenomegaly that he observed, the proper proportion of leukocytes was preserved. In nearly every other case there was a relative lymphocytosis or mononucleosis. This combination of enlarged spleen, mononucleosis, and leukopenia occurs in many cases of high-grade anemia, and, if improvement results, the polymorphonuclears are the first to increase. On the other hand, continued decrease in the number of leukocytes seems to be of bad prognostic import. Chronic enlargement of the spleen without leukopenia seems to show often a lack of anemia, and it is never so marked as in those enlargements which show a decrease in the leukocytes.

Many acute diseases, which show, from the blood examination, a stimulation of the megaloblastic tissue, are without enlargement of the spleen. In conformity with this we find, in many cases in which the absence of anemia, occasionally even a hyperglobulia, points to a stimulated or increased bone-marrow function, a moderate leukocyte count with only slight swelling of the spleen. A high-grade splenic tumor is only associated with high-grade anemia and leukopenia.

As a diagnostic help, Hess tabulates his results as follows:

A. Chronic splenic enlargement with leukopenia:

1. Primary tumors of the spleen.
2. Banti's disease.
3. Acquired lues.
4. Chlorosis.
5. Grave anemia.

B. Chronic splenic tumor without leukopenia:

1. Tuberculosis of the spleen—primary and general.
2. Metastatic tumors.
3. Hereditary lues.
4. Amyloidosis.
5. Chronic malaria.
6. Chronic passive congestion.
7. Cirrhosis.
8. Polycythemia.
9. Wandering spleen.

HODGKIN'S DISEASE

Etiology. The etiology of this condition still continues to be discussed, and much of the recent literature touches on this point. In fact, back to the time of Hodgkin himself there has existed confusion between this condition and glandular tuberculosis, and many of the cases reported as Hodgkin's disease have been subsequently found to have been tuberculosis. The occasional finding of tubercle bacilli in the glands of cases presenting the clinical picture of Hodgkin's disease has led to the opinion that this condition was either an unusual form of tuberculosis, or that the two diseases were frequently associated. More recently, the view that Hodgkin's disease is a distinct entity has been quite generally accepted, especially since its characteristic histology has been recognized, and since, in many cases, repeated efforts have failed to demonstrate the presence of tubercle bacilli in the tissues by section or inoculation.

During the past year, however, a report of some investigation by Fraenkel and Much¹ seems worthy of consideration. The authors studied a series of cases of Hodgkin's disease by the usual methods, and, in addition, they treated the various tissues, glands, spleen, and adrenals with 10 per cent. antiformin and, after centrifugation, stained the residue in the usual manner for the demonstration of tubercle bacilli. This method was very successful, and in nine out of ten cases of true Hodgkin's disease, with no evidence of tuberculosis, they discovered organisms which had resisted the antiformin and which morphologically could not be distinguished from the tubercle bacillus. They obtained no positive results by any cultural method, and so reserve their final decision on this point. They express the opinion that the antiformin method presents two great advantages—(1) the discovery of organisms when they are present in very small numbers; (2) the demonstration that such organisms are resistant to antiformin, a characteristic due to their containing a fatty substance. The authors conclude that Hodgkin's disease is caused by an antiformin-resisting, gram-positive, granulated bacillus, and is only exceptionally associated with true tuberculosis. The causative organism is, however, closely related to the tubercle bacillus.

On the other hand, the report of Caan² with regard to the deviation of the complement in Hodgkin's disease would point, as he concludes, toward the condition having for its cause a member of the group of the Spirochetæ. He found a distinct deviation of the complement in the four cases of Hodgkin's disease which he studied; this deviation was not so great as that seen in cases of syphilis, but was distinct. He used both the Landsteiner modification of the Wassermann reaction, and the von

¹ Münchener med. Woch., 1910, vol. lvii, p. 685.

² Ibid., p. 1002.

Dungern and Hirschfeld modification of the Noguchi technique, and in none of the cases was there any history of syphilis or any clinical finding suggestive of its presence. The author admits that conclusions should not be drawn from so few cases, and that further observations are necessary.

Karsner¹ has reported a series of five cases, each of considerable interest, one running an acute course, two cases diagnosticated by the examination of glands removed surgically, a case of tuberculous lymphadenitis, whose histological appearance closely simulated that of Hodgkin's disease, and, finally, a case of Hodgkin's disease that appeared to have undergone sarcomatous transformation. The author reports these cases and the autopsy findings in each case, and discusses the various questions raised by them. His conclusions are quoted here in full, as they give, in brief, the present status of knowledge concerning this disease:

"1. Hodgkin's disease is a distinct pathological entity.

"2. Hodgkin's disease may produce or be accompanied by high-grade anemia, usually of the secondary type, occasionally of pernicious type.

"3. The presence of histo-eosinophilia is not of great diagnostic significance.

"4. Surgical removal and competent examination of the involved lymph nodes may lead to an accurate diagnosis.

"5. Although tuberculosis of the lymph nodes and Hodgkin's disease may occur coincidently, tuberculosis is not necessarily a related condition. Hyperplastic tuberculous lymphadenitis may present a histological picture somewhat confusing with that of Hodgkin's disease. The giant cells of this form of tuberculosis differ from those of Hodgkin's in that the former show relatively solid nuclei, and the latter distinctly vesicular nuclei.

"6. Pending the discovery of the essential nature of the disease, it may be said that Hodgkin's disease, a chronic granulomatous inflammatory process, may undergo transformation, with assumption of malignant characters."

DIABETES INSIPIDUS

Etiology. Schwenkenbecher² presents a most interesting case of this uncommon disease, and discusses the etiology in some detail. Three groups of cases may be defined.

1. In this group, the symptoms have some definite psychological cause. The condition is purely a neurosis, and frequently the reduction of the amount of water drunk is followed by a rapid cure.

¹ Archives of Internal Medicine, August, 1910.

² Münch. med. Wochen., vol. lvi, p. 2564.

2. In the second group, the condition is due to some organic nervous disease. Thus, it has been known to follow epidemic meningitis and syphilis of the central nervous system. It is possible that a polydipsia is the primary cause of the condition in this group. Occasionally, suitable treatment of the cause, as in the use of mercury in syphilis of the central nervous system, will be followed by a most satisfactory result, and in some cases a spontaneous cure has occurred.

3. In this group belong the so-called idiopathic cases in which no demonstrable psychic influences or organic lesions of the central nervous system are present. A great many views are held as to the true etiology. Many believe that there is a primary polyuria, due to a functional lesion of the kidneys. Another common view is that the polydipsia is the primary lesion which is due to a retention of metabolic products which require marked dilution for excretion, or, as others insist, is purely a psychosis.

A psychic condition is to be suspected as the cause of a diabetes insipidus when a patient drinks over ten liters of water daily, or, as sometimes occurs, when a patient will drink his own urine when he is deprived of water. If the sensation of hunger is increased at the same time as the polydipsia, or if water is the only liquid which will quench the thirst, then too the condition is probably one of psychic origin. The author considers it possible to have a polyuria similar to a hypersecretion of the sweat glands or salivary glands. In these cases, there is probably a psychic basis responsible for the etiology.

DIABETES MELLITUS

Chemical Problems in Diabetes. Among the most interesting articles appearing during 1910 were the Cartwright Lectures delivered before the New York Academy of Medicine by Professor A. Magnus-Levy, of Berlin.¹ As a whole, it is hardly suitable to a review, as the article is itself of that nature. Certain parts, however, we wish to call attention to, as, coming from such an authority as Magnus-Levy, they carry with them importance such as they otherwise would not have. The first lecture was largely devoted to the subject of glycogenesis, and the author considers that sugar appearing in the urine may be derived from the neutral fats, in addition to its generally accepted carbohydrate and protein sources. A neutral fat is composed of a combination of glycerin plus a fatty acid, and it is probable that sugar may be derived from the glycerin constituent, although not from the fatty acid radicle itself. If so, it is formed on a much smaller scale than the sugar derived from the protein or carbohydrates, and is a thing difficult of proof. To prove

¹ Medical Record, 1910, vol. lxxviii, Nos. 21, 22, and 23.

the contention, it must be shown that the sugar in the urine is greater than the total amount possible to be formed from the carbohydrate and proteid ingested plus the catabolized body protein and carbohydrate. In discussing the formation of sugar from protein, Magnus-Levy concludes that, even in a normal animal, glycogen is formed from protein, and, therefore, carbohydrate is necessary to life, a principle as essential as that of *omnis cellula e cellula*. Under metabolism of the protein he concludes that disturbances only occur in certain periods and in single cases—that is, a toxic loss that cannot be accounted for by insufficient food. Diabetics may subsist on a small protein intake, and the physiological economy in the protein, as advocated by Chittenden, is applicable in the disease.

ACIDOSIS. It is particularly to the discussion of the metabolism of the fats and to the subject of acidosis that we wish to draw attention. Of the so-called “acetone bodies,” the saturation of the body tissues by which produces the condition known as acidosis, oxybutyric acid is split off from the fats and the amino-acids of the proteins, but is not derived from alcohol or the carbohydrates. From the oxybutyric acid, aceto-acetic acid is yielded. The acetone is derived from the diacetic acid and eliminated as such, but is not excreted as acetone, the splitting off taking place in the capillary cells of the lungs or kidneys, or taking place in the urine after elimination. Acetone bodies only occur when carbohydrates are lacking in the food or when carbohydrates are not utilized in the normal way, and, as they are found in minimal traces in health, they must be looked upon as normal intermediate products. Magnus-Levy believes that oxybutyric acid is an obligatory product of metabolism which is broken down immediately by oxidation. A healthy man without carbohydrate will form as much oxybutyric acid as a diabetic. He has given as high as 20 grams to a healthy man, which was completely destroyed. He admits that this is largely an hypothesis, as no one has yet dared to give as large doses to a healthy person as occur in diabetes. In severe diabetes there may be only a normal amount of acid formed, which is not broken down, as there is no utilizable carbohydrate present to exercise an antiketogenic effect. Moreover, there is a retention, as more acid is formed than is excreted. Alkalies, such as sodium bicarbonate, lead to an increased excretion of these retained acids. Glycerin prevents acidosis in a healthy man, but is of little use in a diabetic (probably sugar is formed from the glycerin). Alcohol is of questionable use. As long as coma is not imminent, the oxybutyric acid output does not amount to more than 50 or 60 grams daily; when coma is imminent, it rises to two or three times this amount, as a result of a decrease in the oxidative powers of the body. This may follow a sudden increase in the output of sugar, as has occurred as a result of a sudden nervous shock.

The concluding portion of the last lecture was devoted to a discus-

sion of the unity of the disease, a question which is perplexing to those who have been following the experimental work of the last few years. It has become necessary to assume certain types of diabetes from the various metabolic conditions and from the variety of organs involved. If, as is probable, there are a number of organs concerned in the altered metabolism, they bear either a nervous or chemical (hormone) connection or relation. The action of the liver is passive. Sugar is eliminated by the kidneys, but true renal diabetes is rare (phloridzin experimental glycosuria). As regards the theory of Falta and his collaborators, that the pancreas, thyroid, and adrenals constitute a system which is responsible for sugar metabolism, the pancreas acting in contrast to the two other organs which effect a mobilization of sugar, Magnus-Levy considers it to be based upon too few and somewhat inaccurate experiments. This theory also considers but a single aspect of diabetes, namely, the mobilization of the carbohydrates, and does not consider the new formation, nor the utilization of sugar. In regard to the question as to whether diabetes is due to increased sugar production which exceeds the needs of the body organism, or to deficient sugar combustion, which is the essential question from a metabolic standpoint, he holds the latter to be the primary and essential disturbance. As the muscles are the main seats of carbohydrate combustion, Magnus-Levy believes that future studies along the lines of the relations between glandular hormones and the muscles will lead to the solution of the problem.

Total Metabolism. In 1867, the two famous German physiologists, Pettenkofer and Voit, published their results of a study of the total metabolism of a severe case of diabetes by means of the Pettenkofer chamber, which was built in Munich, in 1862. This pioneer work, the results of which have practically remained unverified, has served as the basis of further metabolic studies, and upon which a large part of the fundamentals of the dietetic treatment has been built up. During the past year, there appeared from the Nutrition Laboratory of the Carnegie Institution a most elaborate study of this phase of diabetes by Benedict and Joslin.¹ Three groups of cases were used—a group of ten severe cases which were never sugar-free (six of whom subsequently died in coma); a group of two moderately severe cases; thirdly, one mild case. The latter two groups are combined in subsequent tables, giving a severe and a mild group. Fifty-six experiments, covering 193 periods averaging one hour each, were made with a respiration calorimeter (mainly chair type, in which the patient sits quietly for one hour), and twenty-six experiments, with 103 periods of about fifteen minutes each, with a respiration apparatus. The observations were mainly made without food and twelve hours after the last meal had been eaten. As the experiments ran over some length of time in several of the cases,

¹ Bulletin of Carnegie Institution, No. 136, p. 234.

almost all of the various stages and degrees of diabetes were investigated. The discussion of the results requires some seventy pages, and we are limited to the most salient features. In contrasting the results of the three types of apparatus used, it was found that in the chair calorimeter, the carbon dioxide production is 17 per cent. higher than with the bed calorimeter, or respiration apparatus, the oxygen absorption 20 per cent., and the heat elimination 29 per cent. higher, this being due to the increased muscular activity of the subject. For the purpose of this review, we need only sum up the total results, as given in Table 179, page 193.

TABLE 179.—*Comparison of carbon dioxide eliminated, oxygen absorbed, and heat eliminated by diabetics and by normal individuals.*

Subjects.	Carbon dioxide per kilo of body weight per minute.			Oxygen per kilo of body weight per minute.			Heat.			
	Chair.	Bed.	Respiration apparatus.	Chair.	Bed.	Respiration apparatus.	Per kilo. of body weight per hour.		Per kilo. of body weight per twenty-four hours.	
							Chair.	Bed.	Chair.	Bed.
	c.c.	c.c.	c.c.	c.c.	c.c.	c.c.	cals.	cals.	cals.	cals.
Normal individuals . . .	3.26	2.95	3.02	3.99	3.51	3.62	1.21	1.01	29.0	24.2
Diabetes, all cases . . .	3.35	3.11	3.13	4.54	4.13	4.15	1.33	1.15	31.9	27.6
Diabetes, severe cases . .	3.53	3.15	3.18	4.85	4.25	4.18	1.40	1.15	33.6	27.6
Percentage increase severe over normal . .	8.3	6.8	5.3	21.6	21.1	15.5	15.7	13.9	15.7	13.9

According to this table, an increase of the metabolism of the diabetic over the normal individual is apparent, an increase of the total metabolism of about 15 per cent., using the heat elimination, as is commonly done as an index. But a careful study of the experiments leads to some doubt as to the accuracy of the conclusions. The experiments were all of short duration, and at a time when little or no food was being catabolized. It is not a matter to be taken for granted that the twenty-four-hour metabolism obtained by multiplication of short periods is the same as a complete twenty-four-hour observation. The authors, in another place, draw attention to the danger of using average figures for comparison, and show how the metabolism is influenced by size, weight, station, etc. If we study the heat elimination in Table 177, we find that the elimination per kilo. per twenty-four hours in five of the six severe cases varied from 31 to 33.4 calories, while in the sixth case it was as high as 39.6—a case which we read, on page 131, “was extremely high-strung, nervous, and apprehensive . . . was not an ideal subject for experiments of this kind.” Yet the figure used in comparison,

is an average of these six cases (33.6). In an attempt to explain the increased metabolism, the nitrogen elimination was studied, and could only be considered to account for not more than 2 per cent. of the total energy transformation. The ingestion of large quantities of protein resulted in a marked increase in the total catabolism.

A study of the same subject by Dubois and Veeder¹ appeared earlier in the year. In their work, a Pettenkofer-Voit chamber was used, in which the patients with food were placed for twenty-two hours and the carbon dioxide output determined. Chemical analyses of the food, feces, and urine were made, and from these the total metabolism was calculated. A summary of the two diabetic cases and the control is as follows:

SUMMARY OF THE THREE CASES.

	Weight.	Total CO ₂ .	Calories.	Calories per kilo.	CO ₂ c.c. per kilo per min.
Normal	70.1	783.8	2295	32.7	3.95
Severe diabetes . .	70.4	748.8	2453	34.3	3.75
Mild diabetes . . .	68.0	778.4	2258	31.7	4.04

The severe diabetic in this case had the highest metabolism, and, in comparison with the normal individual of practically the same weight shows an increase of about 5 per cent. The crux of the question seems to be the comparison with the normal, and the difficulties are manifold. They do not conclude that the metabolism is increased, but note that the metabolism in their severe case is at the extreme upper limit of what may be considered normal metabolism. From a study of both these investigations, which were conducted and calculated on different lines, we find nearly the same result, and may conclude that in severe diabetes the total metabolism is increased from 5 to 10 per cent. The practical conclusion is important—a diabetic must be given food containing sufficient energy, just as much as a normal individual of the same weight and size, and doing similar work. The idea which is current in many writings, that a diabetic can live on proportionately less food than a healthy person, is scientifically incorrect.

METABOLISM. Graham Lusk,² who writes a most interesting chapter on Diabetes in his new book, which appeared during the last year, reviewed the metabolism in diabetes before the American Medical Association at a symposium upon the subject in June. He calls attention to the D:N (dextrose to nitrogen) ratio of the urine, which, with dogs under the influence of a phloridzin-glycosuria, he has found to be constantly 3.65. In a patient on meat-fat diet this same ratio holds. As Lusk holds that it is impossible to convert fat into sugar in a diabetic, despite many views to the contrary, he considers that this sugar must be built up from the protein. As 1 gram of nitrogen in the

¹ Archives of Internal Medicine, January, 1910.

² Journal of the American Association, 1910, p. 2105.

urine represents 6.25 grams of protein, 3.65 grams of carbohydrate may be derived from 6.25 grams of protein. 6.25 grams of protein equals 3.65 grams dextrose equals 1 gram of nitrogen. Or, in other words, nearly 60 per cent. of protein may be converted into sugar. The sugar does not exist as such in the protein molecule, but the protein is first broken down into more simple organic acids (lactic), and from these the sugar is constructed. In another paper, Ringer and Lusk¹ report some very interesting experimental work in which dogs, under the influence of phloridzin, and free from glycogen, were fed with amino-acids. Those fed with glycocoll and alanin, the simplest forms of amino-acids from which the proteins are built up, excreted dextrose. The carbohydrate parts of aspartic acid and glutamic likewise were converted into dextrose. Following injections of tyrosin there was no increase of sugar elimination. It is possible to build up 45 per cent. of the sugar which is derived from protein from these four amino-acids.

The most important practical side of Lusk's paper is the emphasis which he puts upon the folly of estimating the intensity of diabetes in accordance with the percentage of sugar contained in a twenty-four-hour sample of urine. To quote: "There are others who draw conclusions of disturbed protein metabolism from a knowledge of the number of grams of urea in an ounce of urine, without realizing that this is of no more importance than the knowledge of the number of ten-penny nails to the ounce of nails." Lusk insists that the intensity must be determined by the relationship between the ingo of sugar plus the possible maximum of sugar production from protein, as compared with the total output of sugar. Some exception may be taken to this statement, as it is by no means certain that the protein metabolism is very much disturbed in many cases of diabetes. But the possibility of sugar being formed from protein is a factor that cannot be ignored in the study of a case. We wish to insist, however, on the necessity of calculating the relation between the total quantity of carbohydrate ingested and the total quantity of sugar eliminated in the urine. The discussion of a percentage urine is not only valueless, but usually misleading.

Diastase in the Blood. As early as 1874 Kussmel found that injections of diastase were followed by a lowering of the sugar excretion in cases of diabetes. Since that time many investigators have taken up the study of the ferment, as it has been generally considered that a diastatic ferment is of marked importance in determining the relation existing between the glycogen and the hyperglycemia.

Recently Wynhausen² reported the results of some studies, using the new method of Wohlgemuth for determining the quantitative relation of diastase in the blood. In all, 88 cases were studied, of which

¹ Zeit. für Phys. Chemie, Band lxvi, p. 106.

² Berlin. klin. Woch., July 3 and 10, 1910.

31 were diabetes. In the non-diabetic cases the diastase unit varied between 12.5 and 125; in the diabetic, between 12.5 and 80. The average in non-diabetic cases was 34.8; in diabetics, 33.3. From this Wynhausen concludes that the quantity of diastatic ferment is variable and bears no quantitative relation to certain diseases. The number of units of the diastase seemed to bear an inverse relation to the sugar excretion, increasing in individual cases as the sugar decreased. The degree of acidosis apparently bore no relation to the amount of diastase present. From these results the author considers any relation in the quantity of diastase in the blood to diabetes mellitus as unproved.

Antiketogenesis. Under the term antiketogenesis, Woodyatt¹ has contributed a most interesting study of the relation between the carbohydrate and the fat metabolism. Acidosis is the result of a diminution of carbohydrate oxidation, whether it be from starvation or from inability to use carbohydrates, as in diabetes. Sugar and altered substances which, while undergoing oxidation in the body, have the power of lowering the acidosis are known as antiketogenic substances. How antiketogenic substances act is a problem—probably, Woodyatt thinks, by the action of the partially oxidized products of glucose upon the acetone bodies derived from the fats. If such an intermediary substance could be found which is not toxic, it could be used as a substitute for glucose, and act as an antiketogenic substance in the body. Woodyatt has used glucol aldehyde (a diose, the simplest sugar possible) and glycerin aldehyde (a triose). The former produced gastro-intestinal symptoms and proved toxic; the other was not toxic, but of uncertain value. It is a complicated chemical problem as yet in its infancy, but it opens a field of investigation that may, perhaps, lead to the discovery of a substitute for glucose which may be utilized in the treatment of diabetes.

Internal Secretions. Falta² has again emphasized the importance of the antagonistic action of the ductless glands to which we referred last year. He calls attention to the disproportion between the demonstrable changes in the pancreas and the intensity of the metabolic disturbance in diabetes, which necessitates our seeking farther for the cause in many cases. Stimulating influences producing mobilization of the carbohydrates are sent out from the glands of the chromaffin system, while the thyroid secretion exerts an opposite influence. The constant mobilization of the sugar is slowed by the action of the pancreatic secretion, which is under the influence of the vagus. Sugar is formed from the carbohydrates and protein in the liver, and the discharge of the sugar from the liver is under the influence of adrenalin. The carbohydrate metabolism is regulated by a centre in the medulla from which impulses reach the chromaffin system by the splanchnic nerves, regulating the discharge of adrenalin, and the pancreas by way of the vagus. So in

¹ Journal of the American Medical Association, vol. lv, No. 25, p. 2109.

² Prag. med. Woch., 1910, No. 7.

diabetes we must consider not only a pancreatic type, but a type due to an excessive function of the chromaffin system.

Pathogenesis. A rather curious hypothesis has been advanced by L. A. Arany¹ to account for the various phenomena of diabetes. As the amount of sugar in the blood in health never increases over 1 per cent., regardless of the richness of the food in carbohydrates, it is to be considered that the sugar derived from the ingested carbohydrates is changed over into a reserve stuff, partially before its entrance into the blood and partially afterward. The dextrose, taken up as such, is absorbed and carried to the liver, when it is changed to glycogen. This glycogen furnishes the blood with sugar and, in turn, the muscles and organs with energy, and leaves the liver apparently as a result of nervous influences. It reaches the blood in an unchanged state, where it is transformed into sugar by an inactive ferment, in proportion to the degree in which an activating substance is furnished to the ferment. This activator, which in all probability is of bacterial origin, is introduced into the blood only in such quantity as is necessary to maintain the sugar content of the blood, any excess of glycogen being carried to the muscles, where part of it furnishes energy, and the rest is stored as a reserve.

The more complex carbohydrates, after they are partially broken down by the saliva and pancreatic juices, are changed into fat in the intestine by the action of the intestinal juices, and reach the blood through the lymph channels. It seems probable that this transformation of carbohydrate into fat is due to the action of some substance formed by the action of symbiotic bacteria in the intestine. Under pathological relations there is some disturbance in the co-working of the bacteria, which produces a decrease in the transformation of the carbohydrates into fat and an increase in the activating substance which stimulates the action of the glycolytic ferment of the blood. Altered relations of life produce an irregularity in the normal bacterial working in the intestine, and thus alter the carbohydrate metabolism. An exact knowledge of the intestinal flora is of especial importance, and is necessary for a better understanding of the metabolic diseases.

Relation of the Pancreas to Diabetes. After a careful and thorough review of the immense amount of experimental and statistical work upon this subject, Pratt² adds some interesting experimental work of his own, and draws conclusions as to the status of the relationship. His own work, briefly, consisted in separating the duodenum from the pancreas in a dog. The animal did not develop diabetes, although marked atrophy of the pancreas occurred, and only remains of dilated ducts and acini were present in histological sections. None of the islands of Langerhans

¹ *Cent. für Innere Med.*, 1910, No. 30.

² *Journal of the American Medical Association*, vol. iv, p. 2113.

remained. From this, Pratt argues that, if any internal secretion is present, it must have been produced in the acini. His summary is as follows:

Total removal of the pancreas always leads to diabetes. Atrophy of the pancreas, produced by excluding all the pancreatic juice from the intestine, decreases the assimilation limit for sugar. Transplantation of a portion of the gland, when the remainder is extirpated, prevents diabetes from developing. The islands of Langerhans are usually involved in diabetes and are usually associated with changes in the acini. All the islands may disappear without diabetes developing. In progressive atrophy of the pancreas, both islands and acini are gradually destroyed.

The conclusion is justified that the pancreas has an internal function concerned with the metabolism of sugar. The nature of this function, the relation of the islands of Langerhans to the acini, the significance of histological changes in both structures, these and other problems still await solution.

Experimental Diabetes. In a paper on the various types of experimental diabetes, Macleod¹ defines three mechanisms by which dextrose may appear in the urine (glycosuria). The first depends upon a hyperglycemia due to increased production of sugar by the liver; the second, upon a hyperglycemia due to diminished utilization by the tissues; and a third type, in which the glycosuria depends primarily upon a derangement of renal function, and in which there is no hyperglycemia (*e. g.*, phloridzin glycosuria). To this first type, which depends primarily upon disturbed glycogenic function of the liver, Macleod devotes the rest of his paper, and attempts to bring into association some of the more recent diabetic studies, such as the influence of the ductless glands. As a primary premise, the author holds that in nearly every variety of diabetes there is an excessive production of sugar, due to hepatic glycogenolysis, in some, the glycosuria disappearing when all the glycogen has disappeared from the liver; in others, persisting, the dextrose being derived from other sources and being accounted for by a reduced glycolysis. The ultimate source of the glycogen is from the ingested carbohydrates and protein, and it is stored in the liver and the muscles to be used when needed. Macleod attacks the views of Pavy, which we discussed in some detail in *PROGRESSIVE MEDICINE*, 1909, that the glycogen, after being broken down into glucose, is attached to the protein molecules as a sort of side chain constituent. The work of Rona and Michaelis² shows that the sugar in the blood exists in the form of a simple solution; it is not precipitated by colloids as is the protein, nor does it react to dialysis experiments, as it would were the dextrose in a protein combina-

¹ *Journal of the American Medical Association*, 1910, p. 2111.

² *Biochem. Ztrock*, vols. xiv, xvi, and xvii.

tion. Only two possibilities remain which maintain the percentage of dextrose in the blood at the almost constant level of 0.10 to 0.15 per cent., either some chemical constituent of the blood having some direct action on the liver cells, or else there is a nervous reflex present which controls the mechanism of carbohydrate metabolism. To this latter view, Macleod gives his support. The liver after death has an increased glycogenolytic power, a function which in life is under nervous inhibition, as it is not apparently due to a change in the amount of glycogenase, the converting ferment of the liver. There is also as much glycogenase in the blood as in the liver, which is another proof of some inhibitory control. The exact nature of the mechanism by which glycogenolysis is held in check during life is unknown. In the liver it is an intercellular reaction, and hence more or less dependent upon the vitality of the protoplasm. During life certain conditions bring about glycogenolysis, conditions which Macleod assumes produce the experimental glycosuria. Noticeably they are nervous influences and asphyxia, as well as certain drugs, the mechanism of which is not understood, and hence are not considered in the paper. There is a centre in the fourth ventricle from which fibers pass by the sympathetic system to the liver. Stimulation of this causes glycosuria as long as there is glycogen left in the liver. Afferent impulses are probably carried to this centre by the vagus, but as vagus stimulation causes asphyxia, this interferes with an absolute proof. In the nervous control of the glycogenic function there are three possible mechanisms: (1) The control of the glycogenase; (2) a control of the conditions which retard or inhibit the activity of the ferment; (3) vasomotor constriction leading to anemic conditions of the liver cell, which permits glycogenolysis to proceed. Macleod concludes that the mechanism involved is one of the first two.

Hyperglycemia following asphyxia is probably due to stimulation of the glycogenic centres by the increased carbon dioxide resulting from the asphyxia. In discussing the internal secretions, he follows the explanation of Pollak¹ that the action of adrenalin is rather on the nerve supply of the liver than any inhibitory action on the pancreatic secretion, quoting Ritzman's² work, who found that adrenalin only produces glycosuria when it is given in sufficient doses to produce a rise in the blood pressure, *i. e.*, when it acts on the nervous system. The import of Macleod's work, much of which is based on his own experimental studies of the past few years, is to return to the study of the liver as being one of the organs fundamentally at fault, an organ which most observers consider only passively involved in the pathology of diabetes.

Glycosuria and Graves' Disease. Drury³ has called attention to this syndrome, which is not of infrequent occurrence, but to which little

¹ Archiv f. Exper. Path. u Pharm., 1909, vol. lxi, p. 166.

² Ibid., vol. lvi, p. 231.

³ Dublin Medical Journal, February, 1910.

attention has been paid, and reports a case of Graves' disease in which glycosuria was quite marked. It is a clinical picture to which considerable importance is due in the light of recent experimental work, which has shown that the thyroid gland secretes some substance which inhibits the secretion of the pancreas. Winter, in the same journal, reports another case in which, in addition to the symptoms of an exophthalmic goitre, a glycosuria was present.

Diabetes and Tumors of the Female Genital Tract. That there is some inter-relation between these two conditions, Hirschfeld¹ believes for the following reasons:

As a rule, diabetic women take on a more severe form of the disease during pregnancy, which, in the majority of cases, returns to the original condition when pregnancy is completed. A large number of women show a lower tolerance for sugar during pregnancy, although they are not diabetic. It has been noted that the two conditions, pelvic tumor and diabetes, frequently occur together or rapidly following one another. In women suffering with bleeding from uterine myoma, it has been noted that this is much lessened when the patient has been placed on a diabetic diet. In a number of cases in which the two conditions have been present, a disappearance of the glycosuria has followed the removal of the tumor. Hirschfeld thinks that the growth of a pelvic tumor, either uterine or ovarian, probably produces some changes in the glands which regulate the carbohydrate metabolism.

Some Principles of Therapy. In discussing the treatment of diabetes mellitus, W. Voit² emphasizes certain fundamentals which are often neglected. In the early stages of the disease the urine is often sugar-free at certain times of the day, hence it is necessary to test for sugar from a twenty-four-hour specimen of urine. In testing for a carbohydrate tolerance, starch should be given, as in some people an alimentary glycosuria may occur after the ingestion of 100 grams of sugar, while there may be no glycosuria after 100 grams of carbohydrate, in the form of starch, is given. The percentage of sugar in the urine is not nearly so important as the total amount in a twenty-four-hour specimen, *e. g.*, 4 per cent. of sugar in 2000 c.c. of urine equals 80 grams; 3 per cent. of sugar in 3000 c.c. of urine equals 90 grams.

The quantity of urine does not necessarily fall with the percentage of sugar. It is necessary to know how much sugar is ingested. Thus, for example, take a case with 80 grams of sugar in the urine. If 150 grams were ingested, the patient has metabolized 70 grams of the ingested sugar. If only 60 grams were ingested, there has been the formation of 20 grams from protein. Two conditions showing the same degree of glycosuria, but of markedly different therapeutic and prognostic importance.

¹ Berl. klin. Woch., 1910, p. 2335.

² Klin. ther. Woch., 1910, Nos. 5 and 6.

In discussing the oatmeal cure of v. Noorden, Voit lays stress on the fact that it is only of benefit if the original technique is exactly carried out. That is to say, first, a withdrawal of carbohydrate; secondly, vegetable days; thirdly, oatmeal days; and again, vegetable days.

Recent Advances in Treatment. In the American symposium previously mentioned, J. B. Wallace discussed the recent advances in treatment. No specific or etiological treatment has as yet been found; striking advances, however, have been made along dietetic lines as more detailed knowledge of the metabolic changes has been obtained. He mentions the disappointing results that have followed the use of an *extract of the islands of Langerhans* prepared from fishes, the use of *secretin* to stimulate pancreatic activity, the *transplantation of pancreatic tissues*, etc. Under drugs, he considers *alcohol* in moderate quantities to be of use in aiding digestion, but cautions against an individual idiosyncrasy, in which case it may be harmful. He does not consider the use of *atropine*, as recommended by Rudisch, and which we discussed in PROGRESSIVE MEDICINE, 1910, to be of much benefit, and Wallace has found it to be of no effect in depancreatized dogs. Under the *dietetic treatment*, the question of energy requirement which we have already discussed is considered, and the necessity for giving sufficient food to cover this energy requirement.

Practically, it can be concluded that high feeding is injurious, that, in some severe cases, the minimal amount which will maintain the body weight brings the best results, and that an amount equal to that required for a healthy man is to be recommended. Starvation days and long periods of low diet are not unattended with danger. As regards the quality of the food, the diet varies with the case. For determining the class to which the case belongs, Wallace uses the v. Noorden test diet, which is familiar to all. In mild cases, after the tolerance of sugar is determined, the patient is placed on a carbohydrate-free diet for two weeks, to reduce the hyperglycemia and increase the carbohydrate tolerance. A mixed diet should then be given, so restricted in carbohydrate that no sugar appears in the urine. Once every three months there should be a carbohydrate-free diet lasting for at least two weeks. In severe cases, high protein feeding is not desirable, and a glycosuria persisting under a carbohydrate-free diet may be made to disappear if the protein of the food is cut down; 200 grams of cooked meat per day is the maximum allowed, and not more than 12 to 15 grams should appear in the urine. The protein of eggs and vegetables are to be preferred to those of meat, as they affect the glycosuria less. In severe cases, patients do better on one kind of starch than when several kinds are taken together. Hence the rice, potato, and oatmeal treatment, which we discussed in the two previous years. Of these, Wallace considers the last to be of the most service. Fats may be given in large quantities, as the amount of acetone is not influenced by the quantity of fat in the food, although

the acetone bodies are mainly derived from fats. It is recommended to remove the lower fatty acids in butter by washing. In this connection, the recommendation of Lusk,¹ that oleomargarine is to be preferred to butter, as it contains more of the higher fatty acids which yield less β -oxybutyric than the lower fatty acids, is of interest.

IODIDE OF CALCIUM. The use of iodide of calcium, 5 to 15 grains, three times a day, is recommended by H. E. Smith.² It is not advocated as a specific, but of use in cases in which codeine is of no value in reducing the quantity of sugar or improving the patient's general condition. Smith thinks it is of value in ridding the patients of the wretched feeling of "illness" which most diabetics seem to suffer from. Its use in three cases is briefly reported, in which there was a reduction of from 5 to 6 per cent. in the output of sugar, with a decrease in the amount of urine. Fourteen other cases have been treated with similar results. Mention is simply made of the patients being on a diet, details of which are omitted, and so it is impossible to judge of the influence of the calcium iodide on the course of the disease.

THE USE OF THE SOY BEAN IN THE DIETETIC TREATMENT. The use of the soy bean, a leguminous plant indigenous to Asia and more recently introduced into America by the Department of Agriculture for a forage crop, is recommended by Friedenwald and Ruhräh³ as a valuable addition to the diet of the diabetic. It contains a very low amount of carbohydrate, the composition being, roughly, as follows: Water, 10 per cent.; protein, 35 per cent.; fat, 17 per cent.; starch, 5 to 6 per cent.

It may be prepared for use in the form of a vegetable, or as a gruel, or as an addition to broths. Because of the exceedingly low carbohydrate value, it is impossible to make a bread from soy bean flour alone, but this may be prepared by the addition of some wheat flour. A bread thus prepared contains, according to the author's analysis, only 20 per cent. of carbohydrate, as contrasted with 60 to 70 per cent. of ordinary bread. Recipes are given in the original article. The food has, as yet, only been used in a rather small number of cases, but in these, when the gluten bread of a restricted diet has been replaced by soy bean flour, there has been a reduction from 10 to 40 grams in the total amount of sugar excreted daily. No figures are given as to a coincident increase or decrease in acidosis, although, from the brief history given, it seems probable that most of the cases were of the severe type of diabetes. Further trial may prove the soy bean to be of excellent service in increasing the small number of vegetable substances which are permitted to the diabetic on restricted diet.

Another vegetable, which is new to the English market, is the *Chinese artichoke*, a species of wort. This is recommended by Saundby⁴ as

¹ Science of Nutrition, 1910, p. 291.

² Practitioner, February, 1910.

³ American Journal of the Medical Sciences, December, 1910.

⁴ British Medical Journal, 1910, p. 568.

suitable to be added to the diet of a diabetic, as it contains practically no starch, this having been largely replaced by inulin in the fiber of the vegetable.

THE PRACTICAL DETERMINATION OF ACIDOSIS. As acidosis is the chief danger in diabetes, Blum¹ considers it necessary to have an exact knowledge of the degree of the condition when it is present. Acetone and diacetic acid alone give a color reaction, oxybutyric acid must be determined by other methods. It is not so difficult to determine the quantity of acetone, but there is no parallelism between the excretion of acetone and oxybutyric acid, and the latter is exceedingly difficult of quantitative determination, even by skilled chemists. For this reason it has been customary to estimate the degree of acidosis by the indirect method of determining the ammonia. But there are certain limitations to this method which must be considered. Normally, the body alkalies neutralize the circulating acids; when, as in severe diabetes, there is an acidosis, the excess is neutralized by ammonia, and so by determining the ammonia we are able to estimate the degree of the acidosis. But this only holds good as long as the body alkali alone is used for neutralization. Just as soon as alkali (sodium bicarbonate) is given with food, the ammonia excretion sinks, as this ingested alkali is used first for the neutralization. Thus, it is possible to have a severe acidosis with slightly increased or even normal ammonia output.

The following table shows clearly how the administration of sodium bicarbonate may affect the ammonia output, while the oxybutyric acid is not parallel:

Days.	Ammonia.	Oxybutyric acid.	Sodium bicarbonate.
1 weak acid	1.86	31.45	90
2 alkaline	1.09	49.80	70
3	1.34	38.17	70
4	1.59	38.69	50
5	0.92	42.22	50
6	0.56	18.16	50
7	0.68	17.32	50
8	3.33	10.66	30
9 ampho.	5.48	13.62	20
10 acid	2.10	27.15	..
11	3.64	41.33	..
12	4.36	13.84	..
13 weak acid	1.30	7.59	25

Thus, on the sixth and seventh days, with 50 grams of sodium bicarbonate, the ammonia in the urine is nearly normal. On the eighth and ninth days it rose considerably, although the acidosis, as reckoned from the oxybutyric acid, falls. The eleventh and twelfth days, when no

¹ Therap. d. Gegenwart, March, 1910, vol. li.

alkali was given, show a reversed relation between the ammonia and the acid.

Blum, as well as many others, considers a rational treatment of diabetes impossible unless an accurate estimation of the degree of acidosis is constantly kept. As he considers the ammonia method, for the above reasons, to be of little value, he presents the following clinical method, with which he has had excellent results:

Alkalies given during an acidosis neutralize the urine which can be recognized by its reaction, the urine first becoming amphoteric and then alkaline with an excess of alkali. As soon as the reaction of the urine becomes alkaline, the body tissues must be saturated with the alkali. The quantity of sodium bicarbonate necessary to produce an alkalinity of the urine is thus an indicator of the degree of acidosis. In a normal man, from 5 to 10 grams of the salt produces a marked alkaline reaction of the urine; with a slight acidosis, 20 grams are sufficient. When 50 grams or more are required daily to produce the result, the acidosis is considered severe, between 20 grams and 50 grams the acidosis may be considered moderate. It is necessary, of course, to test the urine very soon after it is voided. In coma, it is almost impossible to produce an alkaline reaction. A control of this kind leads the physician to avoid a sudden withdrawal of carbohydrate, which frequently brings on a sudden and unexpected attack of diabetic coma.

Diabetes in Children. Rudisch,¹ in a general paper on the subject, finds the *etiology* as obscure as in adults. At times there is a direct hereditary influence, and it has occasionally, as in adults, followed some one of the exanthemata. In most cases, however, no tangible cause can be found. The prognosis is generally very unfavorable, but if a cure results, it is usually permanent. Thirteen of 15 cases reported by Jacobi in children under twelve years of age died very shortly after the diagnosis had been established. *Treatment* is difficult because of the necessity for strict diet, and there is usually an enormous craving for food which is difficult to satisfy. Rudisch recommends cabbage and cauliflower for this purpose as being very satisfactory. *Fat* is of greatest importance in the feeding, and probably *cod-liver oil*, or *olive oil*, is the most satisfactory in children. Following out the suggestion which he made a year ago, the author recommends the use of *methyl bromide of atropine* in doses of $\frac{1}{60}$ grain three times a day.

An interesting case, in a lad, aged eleven years, was reported by Jampolis,² in which the *diabetes seemingly followed in the wake of concussion of the brain* resulting from a street accident. There had been a marked diuresis and loss of weight for several months before the patient came to the hospital for treatment. At first, a general diet was tried, together with thymus gland and Fowler's solution, but the sugar persisted in rather large quantities, and there was a continued loss of

¹ American Journal of Obstetrics, vol. lxi, p. 357.

² Ibid., p. 337.

weight. Four months after admission the oatmeal treatment was started and persisted in for some time. After nearly a month's trial, the urine became sugar-free, and, although a slight acidosis still persists, the patient's general condition has greatly improved and the weight has been constantly increasing. As the sugar is mainly expressed in percentage, it is impossible to follow the true sugar excretion.

COMA. Stevenson¹ reports a case, in a boy, aged ten years, who developed and died of a typical attack of diabetic coma. He was not seen by the physician until two days before death, but, from the history, it was evident that the condition, although unrecognized, had been present for some time, during which a loss of weight, lassitude, and great thirst had been present. Just before death there were large quantities of sugar in the urine.

CASE WITH APPARENT CURE. Hurter² has reported a case of diabetes, in a girl, aged ten years, in which there has been an apparent cure. As there are but very few cured cases on record, and as the prognosis of diabetes in young people is usually very bad, the case is of especial interest. The family history was negative but the previous history may have had some bearing on the etiology. Some time before the onset there had been an attack of severe acute intestinal trouble, which was apparently of an infectious nature, as others of the household were similarly attacked. This left the gastro-intestinal tract in poor condition, and the child's digestion was easily upset. Four weeks before admission the child was taken violently sick following an indiscretion of diet. From this time on there were symptoms of marked thirst and hunger, lassitude, and loss of weight. In the third week, sugar was found in the urine and the child was sent to the hospital. Upon admission, the urine contained 9 per cent. of sugar (total grams not given), a faint acidosis, and no albumin. As was suspected from the history that there might be a pancreatic lesion, Schmitt's test meal for pancreatic disease was given, but normal relations were found. The patient was then put on a restricted diet for several days, at the beginning of which the urine contained 15 per cent. of sugar. There was a rapid reduction in the amount of sugar until it disappeared completely after two days of a vegetable diet. Gradually white bread was added to the restricted diet, until it was found that there was a tolerance for 150 grams daily. For six weeks a restricted diet was maintained, containing 100 grams of carbohydrate daily, with a carbohydrate-free day at the end of each week; 30 grams of sodium bicarbonate were given daily. During all this time the urine remained free from sugar, and the patient was discharged. Seven months later she was again tested for her sugar tolerance, and the urine was found sugar-free after 420 grams of carbo-

¹ British Medical Journal, 1910, p. 632.

² Mediz. Klinik, 1910, No. 4, p. 141.

hydrate were given. The symptoms had disappeared, and the child had gained fourteen pounds in weight. Fifty grams of dextrose were given at one time without any glycosuria appearing. At the time of writing, ten months after the urine first became sugar-free, the child is apparently perfectly healthy and on an unrestricted diet. The author attributes the successful outcome to the probable early stage in which the case came under observation, and the vigor with which the diabetic treatment was carried out.

Glycosuria in Infancy. Langstein¹ discussed the glycosuria of infancy, and looks upon this condition as a symptom of gastro-intestinal disease and not a true condition of diabetes. In the large number of the chronic nutritional diseases of artificially fed infants, especially those in which a high percentage of carbohydrate is given, sugar is found in greater or less quantities in the urine. It is a sign of decreased tolerance on the part of the child for prepared food and cow's milk, and disappears rapidly when a suitable food is given. He has observed but three cases in which a glycosuria has persisted in infants under one year of age. In two of these there were definite lesions of the central nervous system, one being a case of hydrocephalus and the other a case of monster formation, which lived but a few days, in which the cerebrum was absent. In older children with diabetes, Langstein has had best results with the v. Noorden oatmeal diet.

EXOPHTHALMIC GOITRE

The term exophthalmic goitre, as a name for the disease under discussion, has been criticised for some time, inasmuch as it really refers to two symptoms of the disease, one or both of which may be absent in a given case. The term *thyroidism* or, better, *hyperthyroidism* is suggested as more scientific, and as expressing more accurately the real physiology of the disease as we understand it today.

ETIOLOGY. Of the seven theories of the etiology of hyperthyroidism—cardiac, sympathetic, nervous, gastro-intestinal, parathyroid, thymus, and thyroid—mentioned by Heineck several years ago, Jackson and Eastman² state that those regarding the sympathetic system and the thyroid, especially the latter, are the only ones to survive. It seems now probable from all the evidence at hand that the secretion of the thyroid gland acts on the sympathetic system, perhaps directly on the chromaffin substance which it contains. In hyperthyroidism, something—in many cases apparently a mental shock—excites the sympathetic system, which brings about an increased thyroid secretion; this, in turn, reacts on the sympathetic system, for which it seems to have a special affinity, and so a vicious circle becomes established.

¹ Verhand. d. Cong. f. innere Med., 1909, p. 209.

² Boston Medical and Surgical Journal, September 15, 1910.

The gland may show great hyperactivity without actual enlargement, and it is possible that some change in the quality of the secretion may produce the symptoms without any increase in quantity. Then, too, following some stimulus or irritation, a cystic or colloid goitre may suddenly become active and produce typical symptoms of hyperthyroidism. Hyperfunction and degeneration may co-exist in the same gland.

As a criticism against this theory of hypersecretion, Krumholz¹ urges the absence of direct proof of the detoxicating function of the thyroid, the lack of direct demonstration of the presence of toxins in the body metabolism, the want of positive evidence of the excess of secretion in the disease, and the finding of MacCallum of compensatory glandular hypertrophy in the thyroid in exophthalmic goitre.

For this increased activity of the thyroid numerous opinions and theories have been proposed, some of which have been based upon pathological and experimental work, while others have been mere speculations. In the last few years, moreover, much interest has been manifested in the part played by the glands with internal secretions in the causation of this disease. This work, however, up to the present time has not given us any very definite conclusions of practical importance.

Especially bearing on this latter point is the work of Rogers,² based partly upon his work with Beebe on the substances found in the thyroid secretion (nucleoproteid and thyroglobulin) and partly on the work of Eppinger, Falta, and Rudinger on the interrelation of the thyroid, pancreas, and chromaffin system. While the work of the latter investigators has been questioned, it may be of interest briefly to review Rogers' application of their ideas to the etiology of exophthalmic goitre.

The conclusions of Eppinger, Falta, and Rudinger go to show that the thyroid and the chromaffin system interact upon each other; that both exert an inhibitory effect upon the pancreas; while the pancreas, on the other hand, exerts an inhibitory influence on the activity of the thyroid and the chromaffin system.

Rogers and Beebe have shown that the thyroid produces two substances, a nucleoproteid and a globulin; the former accelerates the heart by action on the accelerator nerve or on the sympathetic system. By its action on the sympathetic system, and so on the chromaffin system, which is intimately associated with it, the nucleoproteid produces an inhibitory effect on the pancreas. This substance probably remains constant in its physiological effect, though decreasing somewhat in amount in the course of the disease.

The globulin, on the other hand, he assumes to have a universally activating effect in all the organs and tissues of the body, even in the

¹ Illinois Medical Journal, March, 1910.

² Annals of Surgery, February, 1910.

organ which produces it. This substance, unlike the nucleoproteid, slowly or rapidly deteriorates in its physiological effects as the exophthalmic goitre advances. It may, however, in some instances, be found in excessive amounts as a compensatory product or in response to an auto-activation of the gland by its own thyroglobulin.

In Graves' disease, following overstrain or fatigue, there is an impairment in the output of every organ, in which the thyroid is no exception; with the impairment of its secretion, which has a universally activating function, there is a demand for more secretion; this is supplied by the gland through proliferation and increased activity of its epithelium, and the colloid is thus increased in quantity but poor in quality. With the increased thyroglobulin poured into the circulation there is too much nucleoproteid, and this overstimulates the whole sympathetic system, including the heart and adrenal glands. The chromaffin system, through the sympathetic nerves, is thus forced to inhibit the functional activity of the pancreas, and the important digestive and nutritional processes which should be carried on in the intestines become impaired or disordered. As a result of this, the general nutrition, already damaged by fatigue, suffers still further. There follows an increased demand for the poor quality of the thyroid secretion which is again supplied in too great abundance with stimulation of the sympathetic nerves, and inhibition of the pancreas, and thus is established the first vicious circle. The second is assumed to lie in the superabundance of poor thyroglobulin, which may be insufficient in some organs to produce in them an irregular pathological action, yet it returns in the circulation and compels the thyroid to continue its pernicious activity. The theory, as yet, seems to rest on too insecure bases and contains too many assumptions to be generally accepted.

Hoffman¹ believes that the cause of the disease may be due to a permanent excitation or depression of the vasomotor centre, in which case the disease might be cured by a sudden shock, such as cauterization of the nose, hypnosis, or autosuggestion, but in which surgical interference would not prove effectual, as the central cause still exists and continues its action on the part of the thyroid still left. In these cases, the goitre is probably only coördinated with the other symptoms of the disease, although the morbid thyroid secretion may secondarily aggravate the symptoms.

Aside from the central nervous system, the cause of the disease may be in the thyroid itself, or in functional disturbance in the other glands with internal secretion. He discusses at some length the relation of the thyroid and the suprarenal glands and their antagonistic action; in this relation, he asserts that exophthalmic goitre is evidently the result of excessive thyroid functioning plus insufficient functioning of the supra-

¹ *Zeitschrift für klinische Medizin*, lxi, Nos. 3 and 4.

renals, while myxedema represents just the reverse—thyroid insufficiency with excessive suprarenal functioning.

His experiments on the frog's eye confirm this assumption—the serum of thyroidectomized sheep and of myxedematous patients dilating the pupil, while normal serum shows no such influence.

Crile,¹ in his Ether Day Address at the Massachusetts General Hospital, on "Phylogenetic Association in Relation to Certain Medical Problems," attempts to explain many of the phenomena of Graves' disease and to supply some of the factors to explain both the genesis and the cure of the disease. He says that there is evidence, though perhaps not conclusive, that the thyroid gland has the power of accelerating the discharge of energy in the human body. The evidence for this is as follows: In myxedema, with its lack of thyroid secretion, there is a dulness of reflexes and of intellect, a lowered muscular power, and generally a sluggish discharge of energy. In Graves' disease there is an excessive production of thyroid secretion. Here the reflexes are greatly sharpened, energy is discharged with very greatly increased facility, and metabolism is at its maximum. The same holds true in the administration of thyroid extract in large doses in normal subjects.

In the course of sexual activities there is an increased action of the thyroid, as indicated by an increased size and vascularity of the gland. In cases of Graves' disease, fear and injury probably stimulate the gland to increased activity, as indicated by the increased activity of the thyroid circulation, by the increase in the size of the gland, by the histological appearance of activity in the nuclei of the cells, and by an increase in the toxic symptoms. It has also been shown that electric stimulation of the nerve supply of the thyroid causes an increased secretion.

The origin of many cases of Graves' disease is closely associated with some of the causes of the discharge of nervous energy, especially depressive influences. When these are associated with the sexual evolution of maturing girls, the soil is particularly favorable to the development of exophthalmic goitre. In this disease, one of the most striking characteristics is the patient's loss of control and an increased susceptibility to stimuli, especially to trauma and to fear, and to the administration of thyroid extract. The various causes of the discharge of nervous energy produce alterations in the nervous system and probably in the thyroid gland; this is especially true of the fear stimuli.

The effect of constant fear or worry may be the wearing out of the control cells of the brain. If this influence causes stimulation of both brain and thyroid, its excessive action may cause impairment of the brain and hyperplasia of the thyroid as well. As self-control is impaired, fear obtains the ascendancy and would stimulate the thyroid still more actively. Finally, the fear of the disease itself becomes a stimulus. As

¹ Boston Medical and Surgical Journal, December 15, 1910.

the thyroid secretion causes an increase in the facility for the discharge of nervous energy there is established a pathological reciprocal interaction between brain and thyroid. The effect of the constantly recurring stimulus is heightened by summation. This reciprocal stimulation continues until either brain or thyroid is destroyed. If, however, the stimulation is withdrawn before the fear of the disease becomes too strong, and before too much damage is done to brain or thyroid, a cure results. Cure may be greatly facilitated by a complete rest. A cure implies the return of the brain cells to their normal state, with the re-establishment of the normal self-control and the restoration of the thyroid gland to its normal state. If, therefore, we believe that the continuous stimulation of both the brain and the thyroid gland on the law of phylogenetic association accelerated by summation plays a role in the establishment of the pathological interaction seen in Graves' disease, then it is but the next step to assume that if the nerve connection between the brain and the thyroid be severed, or if the lobe be excised and the patient reinforced by a sojourn in a sanatorium or some environment free from former unpleasant stimuli, the patient will be restored to normal health, provided that the nerve cells, the heart, or the essential organs have not suffered irreparable damage.

Alamartine,¹ from his experiences with exophthalmic goitre and his study of resected goitres, has become convinced that exophthalmic goitre is generally the result of some toxic infectious thyroiditis, entailing cirrhosis with hypertrophy of the gland and insufficient or perverted secretion. He states that rheumatism and tuberculosis are the two infections whose causal influence has been most effectually demonstrated.

The *association of exophthalmic goitre and acute articular rheumatism* has been previously noted. Souques² reports one case in which the rheumatism was followed almost at once by development of symptoms of exophthalmic goitre. In one other case a similar association was noted, but with a little longer interval. In a third, the mother and brother had had acute articular rheumatism. Vincent, according to Souques, not long ago found enlargement of the thyroid in two-thirds of all his cases of acute rheumatism, but it generally disappeared with the rheumatism, leaving no traces. In other cases, hyperfunctioning of the thyroid was evident in the tachycardia and nervous symptoms, and in 4 out of 6 such cases the exophthalmic goitre followed without transition; 3 similar cases have been reported by others. In a later series of 14 cases, Vincent found a history of one or more attacks of acute articular rheumatism preceding exophthalmic goitre.

Kocher³ believes that *excessive iodide treatment* is responsible for the development of exophthalmic goitre in more cases than is generally

¹ Lyon Chir., August, vol. iv, No. 2.

² Bull. de la Soc. Méd. des Hôp, 1910, vol. xxvii, p. 26.

³ Arch. f. klin. Chir., vol. xcii, No. 4.

recognized. Once developed, all iodide medication should be stopped, and all factors avoided which might act unfavorably upon the nervous system. In the case described, the thyroid weighed over 160 grams and contained no less than 0.00368 gram of iodine. If the other cells of the body had stored up iodine in the same way, there would have been 18.4 grams in the body. This patient had a goitre for nearly seven years, and then applied local inunctions of an advertised mixture containing iodine. In four weeks she lost 16 pounds, and the typical Basedow syndrome developed; suspension of the drug and removal of parts of the goitre were followed by gradual recovery.

Short¹ reports the case of a middle-aged woman who had been treated for a perineal carbuncle with iodoform powder and dressing. During three weeks about one-half ounce of powder was dusted on, and altogether about 40 inches of narrow iodoform gauze packing was used. The carbuncle healed under this treatment. For weeks after the cessation of the treatment she complained that she could smell and even taste the iodoform, although there was none in the house. Some weeks after her illness she became noticeably ill; there was great emaciation, loss of weight, nearly 28 pounds below her normal, pulse 120 or more, moderate enlargement of the thyroid, marked tremor, extreme nervousness and listlessness. In the month preceding the report there had been slow but gradual improvement until she was almost well.

Short regarded the case as one of exophthalmic goitre following the use of the iodoform. He suggests that more care should be taken in its use in adults, and especially if there is any tendency to exophthalmic goitre.

Gould and Durand² have noticed the association of exophthalmos, tachycardia, and tremor as the result of *eye strain*. They suggest the possibility of confusing these signs, the result of eye strain with those of incipient exophthalmic goitre. They even suggest that "a common, if not the chief, cause of so-called exophthalmic goitre is eye strain."

PATHOLOGICAL ANATOMY. While it is still a matter of dispute as to whether or not there are constant histological and chemical changes in the thyroids of patients with symptoms of Graves' disease, there are some changes found quite uniformly in the fully developed and active stages of the disorder. These are chiefly infolding and reduplication or multiplication of the epithelial wall and basement membrane, which may go on to such an extent as to entirely fill some or all of the alveoli to the exclusion of the usual colloid. More or less of this condition is present in cases which give the usual signs of thyroidism, and the intensity of the symptoms coincides with the increase of the epithelium.

The chemical analysis of the iodine content of the gland, according to

¹ Medical Press and Circular, September 21, 1910.

² Journal of the American Medical Association, December 17, 1910.

the latest analysis by Riggs and Beebe,¹ seems to point to a decrease in it in direct proportion to the severity of the symptoms of thyroidism. It is possible, therefore, that the ultimate causation of exophthalmic goitre lies in some vital or biochemical defect of the thyroidal epithelium which concerns the ability of the gland properly to take up and utilize iodine. In thyroidism there is an increased quantity of secretion present, and with this there is some evidence that a gradual or rapid deterioration in the quality of the thyroid secretion may be responsible for the continuation and progress of the pathological process.

RELATION OF SIMPLE GOITRE TO EXOPHTHALMIC GOITRE.² Simple goitre is usually considered as entirely distinct from Graves' disease and to represent a totally different process, but there are many reasons for suggesting something of the same pathological physiology, at least in the origin of both the simple and exophthalmic types. The hypertrophy is at first soft and symmetrical, first noted at about the period of puberty or menopause; it is much more common in women than in men and in those not robust, though they may appear stout and well-nourished. The nervous element is noticeable. Under the same conditions of mental and physical strain, discussed under the exophthalmic type of goitre, these patients are apt to suffer with more or less typical symptoms of thyroidism; these may continue or subside entirely.

There is another group of cases developing in this same way, in which after a time there is only a partial disappearance of the goitre, leaving an enlargement, giving the physical signs of a circumscribed, tense, elastic cyst. Then under excitement or strain this will swell, and coincidentally there will be rather marked symptoms of thyroidism, but usually no exophthalmos. Under rest and good hygiene all the symptoms disappear, except the circumscribed enlargement of the thyroid, but are easily again excited, and in course of time other areas of the gland may become involved and the signs of thyroidism, instead of being intermittent, become continuous; they are, however, generally mild, though showing exacerbations, and are then accompanied with exophthalmos.

These cases behave like a "leaking retention cyst in which the retained secretion is toxic and only escapes into the circulation in conditions apparently associated with emotion, fatigue, gastro-intestinal disturbances, bacterial infections, or trauma. This tumor may show histologically the ordinary multiple cystic degeneration, but in some parts, often at the periphery, there will be found changes characteristic of the abnormal thyroid of typical Graves' disease."

SYMPTOMS. Very little in the way of advance is to be expected in the symptomatology of exophthalmic goitre, except probably in a greater emphasis on the early signs or symptoms of incipient disease, or the

¹ Journal American Chemical Society, June, 1909, vol. xxxi, No. 6.

² Annals of Surgery, December, 1909.

more accurate recognition of the incomplete or partial forms. Rogers¹ has given such a good summary of the various symptoms, as found in the different stages of the disease, that a rather detailed abstract is here included.

Typical exophthalmic goitre usually begins insidiously, passes through the stages which are generally conceded to be dependent upon an excess of thyroid secretion, and terminates in myxedema or a condition dependent upon an insufficient amount of secretion. The symptoms of these various stages vary considerably, and may be discussed under four headings:

1. *Incipient Stage of What May Later be Exophthalmic Goitre.* This is usually preceded by a history of more or less prolonged mental and physical strain. The disease may sometimes appear suddenly, as after a severe infection, a traumatism, or extreme emotion. With the exception of the action of the first cause, the sudden development of fully developed Graves' disease involves the belief that the disease must have existed in some latent form, or that the thyroid must have possessed some inborn or acquired weakness.

The first symptoms noted are those of overfatigue and anemia, though the hemoglobin may be only slightly below the normal percentage. These are followed by insomnia, loss of appetite and constipation, overactive cerebration, but with an inability for sustained effort, a tendency to irritability of temper and melancholy, muscular weakness, dyspnea, a thumping, overactive heart, producing tachycardia, at first intermittent and later, after exertion, continuous. The constipation may change to frequent loose stools or diarrhea. Throughout the whole process there seems to be a vague, yet distinct, connection between the emotions or central nervous system, the heart or vasomotor apparatus, the digestive tract and the muscles.

Mayo² calls attention to the importance of these vague early signs. He states that, with more careful study of cases, now many patients are included under this diagnosis who present only a few of the cardinal signs of exophthalmic goitre, and these only in mild form. In other words, the condition is not one which involves all the organs at the onset, but it is like other diseases in presenting acute, chronic, mild, severe, and irregular or remittent types.

The participation of the thyroid gland in bringing about these symptoms can only be inferred by the beneficial results following the administration of thyroid substance, and by the more definite symptoms which appear later if the disease is allowed to take its course.

This incipient stage may, however, terminate in complete or partial recovery under proper hygienic treatment, or, under less favorable circumstances, in typical exophthalmic goitre.

¹ Annals of Surgery, December, 1909.

² Surgery, Gynecology, and Obstetrics, August, 1910.

2. *The Symptoms of Exophthalmic Goitre in the Early Stages.* The three prominent symptoms of the disease—exophthalmos, goitre, and tachycardia, especially the first two, from which the disease is named—vary so much that the term thyroidism is suggested to prevent confusion, as the thyroid gland seems to be the particular organ at fault. Among some of the less noticeable symptoms, but on which, however, a diagnosis may be made, are intermittent or constant tachycardia, general vasomotor irritability with sudden cutaneous flushing under the slightest excitement, heart thumping, muscular weakness, quick, jerky movements of the extremities and a fine tremor, susceptibility to heat and a tendency to perspiration, insomnia, morning headache, a good appetite, and excessive thirst. If the condition is at all severe, there will be a temperature of 99° to 100° , increasing with the intensity of the process. The stools become light-colored and diarrheic, the blood slightly anemic, with a lymphocytosis somewhat proportioned to the severity of the symptoms.

These early symptoms of exophthalmic goitre may continue for months or years and then improve. Restoration to the normal is never rapid or sudden. The condition may pass into the toxemic stage, with high temperature, labored respiration, rapid pulse, with irregular tumultuous action of the heart. There is then dry tongue, nausea, vomiting, diarrhea, enlargement and tenderness of the liver, and often extravasations of blood in various parts of the body.

3. *Chronic Exophthalmic Goitre.* In this stage the exophthalmos and goitre are more constant and pronounced, but diagnosis in their absence may be made on the vasomotor and nervous irritability and muscular weakness. The skin becomes more dry, appetite and thirst are less, the skin has a brownish or yellow tinge, and there is some edema of the eyes and face which comes and goes; there is a tendency to nose-bleed and the formation of subcutaneous ecchymosis upon the slightest traumatism. The tachycardia is less, some tension appears in the radial pulse, and the tremor and nervous irritability are less marked.

Exophthalmos varies, and may be entirely absent; the goitre is dense, smooth, hard, and generally shrinks in size. The temperature is usually subnormal; the blood shows a secondary anemia, without lymphocytosis; the urine is generally normal. The various psychoses are apt to appear at this stage.

During the late chronic period, owing to the inception of myxedematoid symptoms, there is an increase in weight with decreasing strength. Gastro-intestinal disturbances appear, with constipation alternating with diarrhea and a rather remarkable variation in the size of the liver. This is probably dependent upon congestion the result of blood stasis and a cardiac failure.

4. *Myxedematous Stage.* With the goitre of the same size or rarely enlarging, the weakness is progressive, the skin becomes pale, and shows

increased puffiness about the eyes and face, with dense edema of the lower extremities, mental torpor, slow pulse, and anemia. Some of the signs of the original disease may persist.

The prognosis of this type of myxedema gives a more unfavorable prognosis and is less amenable to treatment than in the variety of spontaneous or unknown origin.

Tachycardia. Although this symptom has for some time been regarded as one of the most important and constant of the symptoms of exophthalmic goitre, the *paroxysmal type of tachycardia* has but recently been noted in its relation to this disease. Bamberger¹ reports 3 cases of his own, and 21 from literature, in which this association was found. This type of paroxysmal tachycardia shows practically the same group of symptoms as is shown by the common type, except that here very frequently an irregularity of the heart action is to be noted; the rate is usually above 140, and may reach 200. This type of tachycardia does not occur very frequently, though probably more frequently than the literature would lead one to think. It probably is not dependent upon the pathological changes in the thyroid gland, but probably takes its origin from the central nervous system, just as the idiopathic form is supposed to do. The prognosis in cases of exophthalmic goitre with this symptom depends more or less on whether dilatation of the heart is present. The treatment for the condition is, however, more or less the treatment of the disease with which it is associated. No result is obtained from the usual cardiac tonics or stimulants. The author refers to the use of tincture of opium by the bowel; pantopon and the bromide preparations have also been of some benefit.

Eye Signs. Among the early signs of this disease, Kocher² emphasizes a sign noted in the eyelid before there is any protrusion of the eyeball. This latter sign is best brought out by having the patient fix his gaze on an object, when there may be slight retraction of the upper lid; this retraction does not invariably occur, but almost inevitably follows if the object gazed at is moved rapidly up and down. This means of inducing the momentary spasm may give positive findings, he asserts, before any other Basedow symptoms are apparent. He ascribes this lid sign to the muscle which Landström recently demonstrated in the upper lid innervated by sympathetic fibers which are stimulated by the toxic substances from the thyroid.

In a general discussion of the various eye symptoms and signs, Harfordt³ states that exophthalmos may be unilateral, and in many cases the protrusion of the eyeball may not be beyond physiological limits. The movements of the eyes are not as much impaired with the exophthalmos of exophthalmic goitre as with that of other diseases.

¹ Deutsche med. Wochenschrift, July 28, 1910.

² Correspond.-Blatt für Schweizer Aertze, February 20, 1910.

³ Ugeskrift for Laeger, January 27, 1910.

The eyelids may be sluggish in their movements, especially in following the movement of the eyeball downward. The absence of normal involuntary winking is also an early sign. Paresis of the ocular muscles is more characteristic than mere insufficiency of convergence, and may develop with other motor disturbances in the course of the disease. Epiphora may be an early symptom, to be followed later by dryness of the eyes and reduced lachrymal secretion. Hyperemia in the eyeball and conjunctiva is rather frequent in both early and late stages of the disease. There is no evidence to show that exophthalmic goitre is directly responsible for the development of cataract, myopia, restriction of the visual field, glaucomatous conditions, or atrophy of the optic nerve.

Poppen¹ reports a case of exophthalmic goitre in a man, aged thirty-seven years, in which the main symptom consisted of marked degenerative changes in the cornea and conjunctiva of both eyes. This symptom occurs more frequently in men than in women, between the ages of twenty and thirty years, and more in the severe types which go on to a fatal issue. These degenerative changes were explained by v. Graefe as being due to the desiccation following the retraction of the lids in very marked exophthalmos. Poppen, however, from a study of his case, believes that they may more properly be explained, at least in a large number of cases, as due to the marked edema of the conjunctiva which is followed by disturbed nutrition of the cornea and adjacent conjunctiva. The symptom was much relieved in his case after scarifications of the conjunctiva, but not before atrophic changes had set in in the eyeballs.

Pooley² reports a case of atypical exophthalmic goitre in a man, aged fifty-seven years, with no enlargement of the thyroid gland and with a very unusual swelling and protrusion of the conjunctiva, which even became ulcerated, and with very severe nervous and mental symptoms. The patient finally improved under the use of the detoxicated extract of thyroid and injections of antithyroid serum.

Blood. Kocher has shown that there is a characteristic reduction in the number of leukocytes in exophthalmic goitre, especially in the neutrophilic variety. The lymphocytes, on the other hand, show sometimes an absolute but more often a relative increase. This increase varies somewhat, though not entirely, with the severity of the hyperthyroidism and its constitutional effects. These changes have been confirmed by a number of writers.

During the last year, however, there have been many criticisms of these findings. For instance, Monroe³ states that the blood, not only in Graves' disease, but in simple goitre, shows much the same characteristics, especially in regard to the leukocytes—numerical reduction of

¹ Deutsche medizinische Wochenschrift, October 27, 1910.

² New York Medical Journal, January 1, 1910.

³ Riforma Medica, July 25, 1910.

the leukocytes, deficiency of polynuclear neutrophiles, and increase of mononuclears. There is also a diminution of the hemoglobin index. In Graves' disease, however, the red cells are usually above the average in numbers, while polynuclear eosinophiles are usually below, the contrary being the case in simple thyroid tumors.

Buhler,¹ in examining the blood of 20 patients with pronounced exophthalmic goitre and 70 with the incomplete type, found a relative lymphocytosis in nearly every case. He regards this change as a sign of the thyroid toxic origin for the symptoms found in these cases. The absence of lymphocytosis, however, is not of such importance negatively. Müller,² after studying 100 patients with simple goitre, from which number had been eliminated those in whom the blood picture might have been influenced by other factors than the goitre, comes to the following conclusions: That the blood changes found by Kocher in Basedow's disease appear in at least one-half the cases of simple goitre, and in some of these the changes are as marked as in exophthalmic goitre; that the reliability of this symptom for the diagnosis of Basedow's disease is therefore limited. Kappis,³ after examination of 11 cases of Basedow's disease, 2 with thyroidismus, and 12 with goitre, states that in Basedow's disease the relative and absolute lymphocytosis is to be explained, in a measure, on the presence in the enlarged thyroid of groups of lymphoid cells.

Carpi⁴ goes even farther after a review of all this literature. His conclusions are as follows:

1. Leukopenia is not a constant symptom of Basedow's disease.
2. Lymphocytosis is one of the more frequent symptoms of Basedow's disease. But in spite of this there are cases in which lymphocytosis is not found.
3. In myxedema there is a typical lymphocytosis with lymphoid metaplasia of the bone marrow.
4. In simple goitre without thyrotoxic symptoms, lymphocytosis is observed which may reach high values.
5. From all this it seems that a characteristic and constant blood picture does not exist in Basedow's disease.
6. Lymphocytosis is to be regarded as the result of a special reactive condition of the lymphoid system to certain toxic products which stand in some relation directly or indirectly with changes in the function of the thyroid gland.

Persisting Thymus. Gebele⁵ found a large thymus in four of five patients dying after operation for exophthalmic goitre at the Munich

¹ Münchener med. Wochenschrift, May 10, 1910.

² Medicinische Klinik, August 21, 1910.

³ Mitteilungen aus den Grenzgebieten der Med. und Chir., vol. xxi, No. 5.

⁴ Berliner klinische Wochenschrift, November 7, 1910.

⁵ Beiträge zur klinische Chirurgie, vol. lxx, No. 1.

Surgical Clinic. This led him to determine the influence of removal of the thymus in dogs, of implantation of thymus and thyroid tissue, and of other experiments on these glands. The conclusions drawn from this research are that the thymus hypertrophies as a natural compensating process to do the work which the diseased thyroid is unable to accomplish. The death of persons with exophthalmic goitre and large thymus must be ascribed not to the "persisting" thymus but to the injury of the heart from the toxic action of the morbid thyroid secretion. He regards the thymus as probably an epithelial gland rather than a lymphoid gland, and the more pronounced the disease in the thyroid the larger will be the thymus. It may be examined by palpation, percussion, and radiography, and, if it is found enlarged, operation should not be undertaken, not on account of danger from the thymus, but because its enlargement shows that the thyroid is irreparably damaged and this will probably be associated with degenerations of the heart. The condition of the latter will serve in a measure as a good index of the severity of the exophthalmic goitre disease.

Diarrhea. With the increasing knowledge of internal secretions there has been an increasing interest in the pathogenesis of diarrhea in this disease. Baluit and Molnar,¹ as a result of their investigations along this line on a woman, aged twenty-seven years, with exophthalmic goitre and having from four to eight semisolid or fluid movements daily, came to the conclusion that the diarrhea was not due to an insufficiency of the external secretion of the pancreas; and, inasmuch as there was neither diabetes nor alimentary glycosuria, they thought that the internal secretion was probably normal.

The phenomena observed suggest that there is an overproduction of a peristaltic hormone in exophthalmic goitre which would explain the azotorrhea and steatorrhea with abundance of ferments. This is probably to be explained as due to excessive functioning of the thyroid, especially as constipation is the rule in myxedema.

Glycosuria. Attention was called in PROGRESSIVE MEDICINE, June, 1910, to the more or less frequent association of exophthalmic goitre and glycosuria by quoting 4 cases reported by Murray.

Drury,² after seeing the report of Murray's cases, had one in his own practice. He quotes Murray's conclusion that in Graves' disease the excessive thyroid secretion thrown into and circulating in the blood first inhibits the islands of Langerhans, and so causes relative insufficiency of the internal secretion, and thus alimentary glycosuria or its easy induction on increase of carbohydrate food results. Finally, it may lead to atrophy of the islands and thus may bring about true diabetes. The case reported is that of a girl, aged eighteen years, who was

¹ Berliner klinische Wochenschrift, August 29, 1910.

² Dublin Journal of Medical Science, February 1, 1910.

admitted to the hospital with symptoms of diabetes. She was greatly emaciated, and had noticed that she had been getting thin for about two months; shortly before this she had noted thirst. She was also suffering from Graves' disease, as evidenced by slight exophthalmos, well-marked retraction of the lids, mild von Graefe's sign, decided bronzing of the lids, slight tremor of the hands, and moist skin. The thyroid was moderately enlarged, pulsated, and showed a thrill.

The heart action was tumultuous and the pulse rapid. She passed from 100 to 177 ounces of urine in the twenty-four hours, with a specific gravity varying from 1040 to 1050, in which diacetic acid was present for the first few days. She was not improving at the time the report was written. Drury calls attention to the fact that occasionally Graves' disease has appeared and later true diabetes has developed. That when the two diseases run together, the diabetes is always of a severe type.

Winter¹ reports the case of a woman, aged fifty-nine years, who nine years ago had a goitre with palpitation. The goitre enlarged during a subsequent pregnancy, decreased after confinement, and got well spontaneously. Later, there were no signs of Graves' disease present, except rather prominent eyes. For the six months before the report, she had had symptoms of diabetes, excessive thirst and appetite, polyuria, and loss of weight. At the time of the report the diabetic symptoms were improving.

Pregnancy. Ward,² in a study of several cases of coincident Graves' disease and pregnancy, and a review of the recent work on Graves' disease and on the toxemias of pregnancy, summarizes his conclusions as follows:

1. "The thyroid gland is, in all probability, concerned in promoting nitrogenous metabolism.
2. "There is considerable evidence that the thyroid gland normally hypertrophies during pregnancy, and plays an important part in the increased nitrogenous metabolic processes incident to that state.
3. "It is very probable that the toxemia of pregnancy is largely dependent upon faulty metabolism; at least, an insufficient metabolism is an accompaniment which greatly adds to the seriousness of the condition.
4. "Failure of the thyroid gland to hypertrophy during pregnancy is probably followed by insufficient metabolism, and may result in the various forms of toxemia of pregnancy.
5. "Graves' disease, by materially altering the quantity and quality of the thyroid secretion, has an important influence upon metabolic processes; therefore, if associated with pregnancy, owing to the increased metabolism incident to that state, it becomes a grave complication.

¹ Dublin Journal of Medical Science, May, 1910.

² Surgery, Gynecology, and Obstetrics, December, 1909.

6. "When there is a failure of the normal hypertrophy of the thyroid gland during pregnancy, and when there is a diseased thyroid, as in Graves' disease, the administration of thyroid substance, by supplying the deficiency of the normal thyroid secretion and by diuretic action, may materially improve a faulty metabolism and thus have a favorable influence upon the manifestations of the toxemia of pregnancy.

7. "The use of the saline extract of thyroid proteids, made from fresh normal human glands, is much more efficient in rapidity and reliability of action than the sheep thyroids as ordinarily prepared; therefore, much more satisfactory results may be expected from its use.

8. "The hypodermic administration of thyroid proteids is greatly superior to oral administration, especially when used in cases of toxic vomiting of pregnancy or in eclampsia.

9. "As the whole subject is yet so very obscure, much further research work along the same lines and many clinical observations are essential to a more definite understanding of the relationship of the thyroid gland to toxemia, but, in view of some results already obtained, the field is at least a promising one.

10. "It is not improbable that further research may show that the parathyroids have an important relation to the manifestations of the toxemia of pregnancy."

Bouvaire¹ reports two cases in which exophthalmic goitre developed during pregnancy. In one case there was first a simple enlargement of the thyroid, which was followed later, after exposure to chilling, by exophthalmos, pulmonary edema, and paralysis of the right heart. These symptoms were relieved by venesection, and, inasmuch as the pregnancy was almost at term, delivery was induced. Aside from a threatening hemorrhage, the postpartum was uneventful. Examination a few weeks later revealed persisting dilatation of the right heart, exophthalmos, enlarged thyroid, tachycardia, and leukoderma.

In the other case, the thyroid became suddenly enlarged at the seventh month, threatening suffocation, and causing intermittent tachycardia. Introduction of the inflatable bag into the uterus induced a few contractions which seemed to relieve the tendency to dyspnea.

The pregnancy then continued to term without further trouble, except for several violent attacks of hysteria. There was no exophthalmos, but the author regarded the case as an incomplete form of the exophthalmic syndrome. The phenomena here described confirm the assumption that the "Basedow accidents" are the result of some neurosis of the sympathetic system or some lesion of the nerve centres.

Basedowoid. Stern has recently applied the term "Basedowoid" to a group of ailments presenting one or more of the symptoms of exophthalmic goitre, but in which, however, on account of the incom-

¹ Presse Médical, April 6, 1910.

pleteness of the clinical picture, the diagnosis of exophthalmic goitre is not permissible. Chvostek¹ discusses the conditions which may give rise to this abortive hyperthyroidism. Among these he places chlorosis, anemia in a neurotic subject, menopause, and cardiovascular neuroses—the latter being associated even with an enlargement of the thyroid and mild protrusion of the eyeballs—lead poisoning, and cholelithiasis with heart symptoms. He reports in some detail a case of disturbance of the pancreas which closely simulated exophthalmic goitre and which was entirely relieved by the administration of pancreas extract.

These cases have many points of resemblance to the group of cardiac neuroses from which differentiation is often impossible. The former group may, however, occasionally be separated by the presence of exophthalmos or a small goitre only noticed by careful examination. Aschner² has proposed a method for differentiating these two groups, based upon the interrelation of the glands with internal secretions. His method consists in the subcutaneous injection of one-quarter to one-half a milligram of adrenalin.

In case of Basedowoid, this is followed by acceleration of the pulse, cardiac palpitation, dilatation of the pupils, pallor, trembling, nausea, rise of temperature of from 0.5° to 1° C., a sensation of dryness in the mouth, slight headache, dizziness, and, within two to three hours, the appearance of glycosuria. None of these manifestations appear after the injection of a similar dose of adrenalin in normal individuals or in those presenting cardiac neuroses.

PROGNOSIS. Attempts at prognosis in exophthalmic goitre treated by medical measures have thus far proved unsatisfactory owing to the lack of reports of cases which have been followed up for some time. The report of White,³ therefore, is of particular interest. He followed up the after-histories of patients who had been admitted to Guy's Hospital during the years 1888 to 1907, inclusive, and of a certain number of private cases.

Of the 169 hospital cases, 49 who had not been operated upon could be traced; of the private cases, 53 similar cases could be traced, making a total of 102. Of these, the total deaths were 15. These did not include the milder forms or types of the disease, which, if included, would lower the percentage of mortality.

Of the 40 hospital cases who did not die, 26 have done well, 12 are moderately well, and 2 have not done well. Of the 47 private cases who did not die, 35 have done well, 9 are moderately well, and 3 have not done well. Therefore, the private cases have done somewhat better than the cases treated in the hospital. He concludes that, taken all together,

¹ Wiener klinische Wochenschrift, February 10, 1910.

² Zeitsch. f. klin. Med., vol. lxx, Nos. 5 and 6.

³ Quarterly Journal of Medicine, October, 1910.

medical treatment will give somewhat better results than surgery in the treatment of this disease.

Syllaba¹ has made a somewhat similar study of 51 cases in which the histories of patients have been followed for several years, the series commencing in 1895. Treatment was exclusively medical, with two exceptions, and the ultimate outcome is 19.6 per cent. improved and 33.3 per cent. cured, that is, favorable in 52.9 per cent. In 5 of the 17 patients regarded as cured, there were 4 or 5 in which the symptoms were comparatively mild, but in the others the syndrome was very severe. In another group the exophthalmic goitre symptoms became modified, the weight increased, the patients felt well and resumed their usual occupations, and have continued in this condition for from three to fifteen years. In 11 cases, the disease progressed to a fatal termination; in 3 others, the patients succumbed to other diseases. He reviews the experiences of others with non-operative treatment, all confirming his results that over half of the patients with exophthalmic goitre can be permanently improved, and that a third are completely cured or at most left with a little exophthalmos.

In the various cases, treatment had been manifold and various; one patient seemed to be improved by one method, while another might be uninfluenced by all. In a few cases the symptoms were aggravated under iodine treatment, in one given internally and in the other after prolonged local applications. He urges the necessity for careful study of every case of exophthalmic goitre under medical treatment and for a long time after treatment has been stopped.

TREATMENT. The medical treatment of exophthalmic goitre, according to Jackson and Eastman,² means to a large extent the treatment of the tachycardia, for when we allay this symptom we also diminish the other nervous manifestations. They use measures to rest the heart and to diminish the thyroid activity. The most important factor here is *absolute rest*, both physical and mental, under the care of a competent nurse. The *diet* must be nourishing and free from stimulating substances. The application of *cold*, locally, over the heart or thyroid, and cold sponging baths are found to have a marked soothing effect. *Bromides* may be used to assist.

The authors have used for some time, with good results, the *neutral hydrobromide of quinine*, as suggested by Forchheimer. The uses of this drug were discussed in PROGRESSIVE MEDICINE, June, 1909. The neutral salt is especially advised, given in 5-grain capsules up to tolerance, usually three to four capsules daily. Toxicity is shown by tinnitus. The drug must be continued for a long period of time, even up to one or two years, to be resorted to again with the reappearance of symptoms.

¹ Therapie der Gegenwart, November, 1910.

² Boston Medical and Surgical Journal, September 15, 1910.

Mumford¹ reports some later results of Jackson and Mead in the use of this treatment. They divide their statistics according as they have heard from their patients by letter or have seen them personally. Of 29 of the former, 20, or 69 per cent., are practically well symptomatically; 7 are unimproved, and 2 are dead. Of the 56 cases seen and examined, 42, or 75 per cent., are cured, that is, they have no signs or symptoms of the disease after two years; 7 of the cases are improved and 6 cases are unimproved.

Chvostek² advises patience, rest, change of environment, especially a trip to the mountains supplemented by hydrotherapeutic measures. He has never derived any benefit from drugs in this disease.

Mendel³ assumes a thyreogenous and a neurogenous type of Basedow's disease. In the one, the thyroid gland seems to be the cause of the symptoms. In the other, either toxins or stimuli working through the nervous system produces secondarily a change in the thyroid gland. He therefore suggests the *intravenous injection of iodine and arsenic*. Both of these substances have been repeatedly suggested in the treatment of this disease, but Mendel claims that not only their combination but their method of application is important. Each dose consists of 2 c.c. of the following solution: Atoxyl, 1 gram, and sodium iodide, 4 grams, in distilled water, 20 c.c.

Each dose will therefore contain 0.1 gram of atoxyl and 0.4 gram of sodium iodide. Injections are given intravenously and, according to the intensity of the disease, daily or every two days, and with improvement of symptoms twice weekly, and finally once a week. He gives histories and results in 10 cases chosen from a larger series. He finds the method prompt in its action and beneficial in its results. It seems especially valuable in the so-called neurogenic forms.

Hoffman⁴ reports 3 cases of exophthalmic goitre in which the symptoms retrogressed after *cauterization of the turbinates*. This he explains as due to a reflex action on the vasomotor system, a disturbance of which he believes to be the cause of the disease in many cases.

Serum Treatment. Of the various forms of serum treatment, probably the most important at the present time is that proposed some time ago by Rogers and Beebe, and emphasized again in the last year by Rogers.⁵ These investigators isolate a proteid and a globulin from the fresh human gland and inject them combined into rabbits or sheep at intervals of from five to seven days for a period of several weeks. The blood of the animal thus immunized to the thyroid proteids is then drawn from the carotid, the serum separated and tested for its potency, and put up in

¹ Boston Medical and Surgical Journal, June 2, 1910.

² Wiener klinische Wochenschrift, February 10, 1910.

³ Therapie der Gegenwart, February, 1910.

⁴ Münchener medizinische Wochenschrift, November 10, 1910.

⁵ Annals of Surgery, December, 1909.

sealed glass tubes each containing from $\frac{1}{2}$ to 2 c.c., according to the potency or activity of the serum.

The two primary proteids cannot be secured pure, but each contains traces of the other; the nucleoproteid may also have a little more iodine in it than the globulin; the physiological difference between the two substances is, moreover, quite considerable. These substances are now being used in many conditions outside of Graves' disease with very interesting and beneficial results. Dr. Beebe has prepared the nucleoproteid and thyroglobulin in a 1 to 1000 solution for hypodermic use.

In the treatment of exophthalmic goitre they study each case carefully to determine, if possible, the exact condition present; that is, whether there is an increase of secretion which can be neutralized by the antiserum or whether the secretion is poor in one or other of the two proteids, in which case they may be administered. In other words, they believe that in certain cases we have to deal with a condition of hyperthyroidism and hypothyroidism, in which a combination of the antiserum with the thyroid extract gives good results. They also employ an extract of the pancreas in certain cases in which the pancreas seems to be at fault.

The principal objection raised to this treatment is the possibility of injury to the rest of the organism by a cytotoxic serum strong enough to act upon any one of the tissues as this serum is supposed to act on the thyroid epithelium.

The use of serum upon thyroidectomized animals proposed some time ago has not been extensively used during the last year, and seems to be falling into disrepute. Krumholtz,¹ however, used the serum obtained from a horse two weeks after the removal of the thyroid gland. Of this, 30 to 120 drops, or 15 to 60 grains of the desiccated serum, was given daily by mouth. He found that, in most cases, the whole symptom-complex was ameliorated, the subjective symptoms improved, the tremor and nervousness diminished, and the nutritional disturbance lessened. In some cases the thyroid gland was reduced in size, and occasionally the exophthalmos receded. The tachycardia, which, according to Moebius, is the fatal symptom, was reduced more promptly and effectively than by any other therapeutic agent.

Of the 14 cases reported, the ailment did not recur in 14.3 per cent. after a lapse of several years. Marked improvement resulted in 42.8 per cent., slight improvement in 35.6 per cent. In one case there was no response to treatment. After treatment had ceased, relapse occurred in 5 cases after periods of 8 and 9 months in the two others. These figures seem to indicate that the serum has an accumulative action like iodothylin, and in order to secure permanent relief should be administered at intervals. In some of the cases, after the first few days of serum treatment the pulse rate increased, while in others the weight

¹ Illinois Medical Journal, March, 1910.

decreased. This peculiarity of action has been pointed out by other clinicians. To secure favorable results, it is necessary to reach and maintain a point of neutralization and then approximate the dosage in each case. Its general use among the poor is as yet impossible, owing to its cost.

Devic and Gardenère¹ report the case of a patient with exophthalmic goitre cured by the serum of a thyroidectomized sheep.

Edmund² gives later reports on cases reported by him in 1908 and 1909, and reports 4 new cases all treated with the *milk of thyroidless* goats. While some of the 19 cases have been lost track of, the reports thus far show rather marked improvement in but a few of the cases. Some were not benefited at all.

Electricity in its several forms has been used in the treatment of exophthalmic goitre by a good many, but there is very little evidence that any form of it is of value except the *x-rays*. It is thought that this agent causes a shrinkage of the secreting tissue, perhaps to some extent kills it, and in this way the secretion of the toxins is checked. As an adjunct in certain cases, this treatment is certainly of value.

In a report on Röntgentherapy for goitre, Freund³ reports the results obtained in 23 cases, of which 6 were of the exophthalmic type. One of these was a very severe case; the other 5 were milder and more chronic.

In the Basedow cases, immediately after the first treatment there was an improvement in the patient's spirits, in the general health, in sleep and appetite. In two cases, there was also an increase in weight. In none of the 6 cases was the exophthalmos diminished. In only 1 case was the goitre and tachycardia influenced in a slight degree, although the irradiation was of an intensive character. ¶

Schwarz⁴ claims that radiotherapeutic treatment of Graves' disease has as high a percentage of success as the surgical method and has none of the danger and pain incident to the latter. He insists that the use of *x-rays* in exophthalmic goitre has a distinct etiological basis, inasmuch as they tend to diminish glandular secretions.

Out of 40 cases treated for a mean period of three months, there was an increase of weight in 26; diminution of the pulse rate in 36; amelioration of nervous symptoms in every case; of the exophthalmos in 15; of the goitre in 8. On these grounds the author claims 90 per cent. of successes for radiotherapy, which is at least equal to the percentage of operative successes.

He points out that the skin of the cervical region is more sensitive than that of other regions of the body, and that this sensibility is further increased in sufferers from Graves' disease. Therefore, care should be taken not to give too strong doses. He irradiates the neck, first in the

¹ Lyon Médical, September 18, 1910.

² Lancet, April 23, 1909.

³ Archives of the Röntgen Rays, June, 1910.

⁴ Arch. d'élec. Méd., April 10, 1910.

anterior direction, then in the left and right lateral directions, with rays filtered through a piece of glass of 2 mm. thickness. The course of treatment must be followed at frequent intervals uninterruptedly for six months.

Kuchendorf¹ reports the beneficial effect of Röntgen-ray exposure in two cases of exophthalmic goitre. One of the cases was of particular interest on account of the possible influence of the x -rays on the cardiac ganglia. The case was that of a woman who had suffered from progressive symptoms suggestive of exophthalmic goitre for ten years rebellious to the usual medical measures, and, as a last resort before thyroidectomy, the Röntgen rays were applied to the thyroid and to the heart four times each. The palpitations subsided along with the profuse sweats; the pulse became regular, 78; the circumference of the neck was less by 3 cm. than before treatment, and the eyes retracted. The patient slept well, felt well, and the dilated heart returned to the normal outline. The last exposure had been made three months before the report, so that no statement could be made as to permanency of relief. This was so striking, however, that the author calls attention to the case as suggesting a direct influence of the x -rays upon the cardiac ganglia.

Beck,² on the ground of the observation that the Röntgen rays seem to have an inflammatory influence on the walls of the bloodvessels (a specific kind of endarteritis), has used the Röntgen method not only on simple goitre of the succulent type, but also on the exophthalmic variety. In this, he has met with considerable success. His statistics for the last five years show the following record:

Large Basedow goitre, 14 cases: 13 patients cured by the combination method of excision and Röntgen therapy; 1 patient considerably improved, and still under treatment (all women). Of 36 cases (all women except one) of small-sized goitres, most of them showing severe symptoms, especially tachycardia, 32 patients cured, 2 improved, 1 case unsuccessful, and 1 showed an increase in size of the goitre and a greater intensity of symptoms. (For the details of the method of irritations, the reader is referred to the original article.) With this treatment he administers an iron-arsenic mineral water, in doses of a tablespoonful three times a day. In early cases, the beneficial effect shows itself quickly, as a rule. The nervous symptoms generally disappear first, and very soon the dyspnea caused by the tachycardia. The exophthalmos improves more slowly, and in some cases a trace of it is left even long after the disease is virtually cured.

As a final summing up of this section of treatment of exophthalmic goitre, the following quotation from an article by Frothingham,³ who

¹ *Deutsche med. Wochenschrift*, May 26, 1910.

² *New York Medical Journal*, May 7, 1910.

³ *Boston Medical and Surgical Journal*, May 5, 1910.

has made a review of the present methods of treatment of this disease, may be added:

“For the patients who can afford it, try properly conducted rest, proper hygiene, simple medication. If no improvement occurs, conduct a short trial of serum, Röntgen rays, or electricity. If, after prolonged and well-conducted medical treatment, no improvement occurs, or if the case is progressing unfavorably, consider operation. Do not wait before considering operation until organic changes have occurred in other organs, especially the heart. For patients who cannot afford proper medical treatment, try the best non-surgical treatment possible along the above lines. If, after a short trial, no improvement occurs, or the patient becomes worse, advise surgical treatment. After the surgical treatment, insist upon a long course of the best medical treatment possible under the individual circumstances.”

OPHTHALMOLOGY

By EDWARD JACKSON, M.D.

Influence of Salvarsan on the Eye. The very extensive clinical experiments with the Hata-Ehrlich "606," now generally known as salvarsan, were commenced with a good deal of fear that this drug, like other compounds of arsenic, might have a very harmful effect on the optic nerve. The cases of blindness from optic atrophy following the use of atoxyl and closely allied drugs, gave good reason to anticipate similar danger from the new treatment for syphilis. From the very large clinical experience now recorded we may conclude that this fear is not justified. Ehrlich¹ claims that, among more than 25,000 cases, there was but one in which the signs of beginning optic atrophy appeared after the injection of the drug. This case, reported by Finger,² was one of tertiary syphilis, which had previously been treated with arsacetin and enesol.

The reports of cases in which ocular lesions of syphilis have been treated by salvarsan, and cases in which ocular complications have arisen after the use of salvarsan, have been collected by Cords,³ and subsequently the records of 12 cases have been published by de Lapersonne and Leri.⁴ Most of the cases of iritis have shown very rapid improvement, and cure within six to twenty days after the injection of the drug. But few failures have been noted. In *parenchymatous keratitis* there have been a few successes, a notable one reported by de Lapersonne, and a considerably larger number of failures. In *optic neuritis* and *choked disk*, numerous and striking successes have been recorded, some after failure with a prolonged use of mercury. Vision has begun to improve sometimes the day after the injection, and has risen from $\frac{5}{50}$ to normal. Only two failures have been reported. In *atrophy of the optic nerve*, some cases have shown improvement, and, in a few, the process seems to have been checked; but in the great majority no effect from the salvarsan has been noticed. The only case of apparent injury has been referred to above. Improvement in the *retinal lesions*, including endarteritis, and in those of the *choroid* have been reported, with some failures. In some cases of *paralysis of the ocular muscles*, recovery has occurred after treatment with iodides or mixed treatment had failed. In other cases, the paralysis remained unchanged.

¹ Berliner klin. Wochenschrift, December 19, 1910.

² Wiener klin. Wochenschrift, 1910, No. 47.

³ Zeitschrift für Augenheilkunde, January, 1911.

⁴ Archives d'Ophthalmologie, vol. xxxi, p. 2.

In a good many cases, *eye lesions have appeared after use of salvarsan* for syphilitic disease of other organs. Among these lesions are iritis, optic neuritis, opacities of vitreous and cornea, choroiditis, and palsies of the ocular muscles. In explanation of such cases, Ehrlich points out that these lesions are probably syphilitic. Some of these have been cured with mercury, others with a subsequent dose of salvarsan. He concludes that they arise from isolated groups of spirochetes that escape sterilization, probably being protected by location in the bony canals through which the cranial nerves pass.

DISEASES OF THE CONJUNCTIVA

Bacteria of the Conjunctiva. Some pyogenic organisms, most frequently the white staphylococcus, can almost invariably be found in the human conjunctiva. Nevertheless, they may become the active essential cause of disease. That infection occurs so rarely through the conjunctiva, Mayo¹ explains thus: (a) The influence of the lachrymal secretion; the upper outer fornix is found sterile twice as frequently as the lower inner portion. (b) The epithelium constitutes a very effective barrier against the most common of these germs. (c) The looseness of tissue, with the large blood supply, allows the conjunctiva to be filled with the fluids containing protective bodies. (d) Phagocytosis of cells forming the lymphoid layer is an additional barrier to infection. Among the organisms thus kept out, besides the staphylococcus, are the xerosis bacillus, Morax-Axenfeld diplobacillus, pneumococcus, bacillus subtilis, and streptococcus. When the conjunctival barrier is broken down by operation or injury, these organisms may all prove dangerous.

Morax² reports a careful study of inflammation due to the white staphylococcus. While the exact diagnosis of such cases requires the microscopic examination of the pus, cultures, etc., a probable diagnosis can be based upon the clinical characters of such an inflammation. These are its subacute character and comparatively slow extension of the process, which is apt to remain circumscribed. Often several weeks elapse between the first appearance of the symptoms and such a development of the disease as leads the patient to seek relief in treatment. The infection, however, is liable to be general, even when the localization of the symptoms is confined to the eye and related parts. A case of episcleral and scleral inflammation, due to the same germ, is reported by Dupuy-Dutemps and Lemarchal.³

Stargardt⁴ has studied, experimentally, the *pathogenic qualities of the xerosis bacillus*. He finds that, injected into the vitreous of rabbits,

¹ Ophthalmoscope, vol. viii, p. 554.

² Annales d'Oculistique, vol. cxliv, p. 10.

³ Ibid., p. 23.

⁴ Proceedings of the Thirty-sixth Ophthalmological Congress at Heidelberg

guinea-pigs, cats, and monkeys, it produces severe purulent inflammation; or a more limited disturbance if a smaller quantity be used. In monkeys, minute quantities cause a slow iridocyclitis; and he concludes that in man it may cause chronic inflammations. He has found this bacillus in eyes affected with panophthalmitis, and twice in eyes that caused sympathetic ophthalmia. The resemblance of the xerosis bacillus to the true diphtheritic bacillus often causes uncertainty as to the true nature of ocular inflammations that do not present the usual characters of diphtheritic conjunctivitis. Four such unusual cases, including abscess of the lid with denuding of the malar bone, conjunctivitis with pustular eczema of the lid, panophthalmitis, and purulent discharge after enucleation are credited by Butler¹ to infection with the Klebs-Loeffler bacillus.

Conjunctivitis from Dust of Tarred Roads. The extensive use of preparations of tar to improve and preserve the road surface makes this a matter of practical importance. An experimental study of the action of such dust upon the eye has been reported by Truc and Fleig.² They find that dust from the untarred road of lime or basalt has but little injurious action upon the conjunctiva, and tends to establish a tolerance. A mixture of tar with aseptic powders is much more irritant. Dust from roads on which tar has been used a long time before is similarly harmful. But the most severe irritation was caused by dust from surfaces to which tar had recently been applied. These authors conclude that the chemical action of substances included in the tar, mechanical injury by particles of dust, and the bacteria included in the mixture, all contribute toward the production of the conjunctival inflammation, blepharitis, dacryoadenitis, and corneal infiltration produced by such dust.

Prevention of Ophthalmia Neonatorum. This subject has, within the last year, received the attention its importance deserves at the hands of general practitioners and obstetricians, as well as from oculists. In the accumulating literature referring to new measures for prophylaxis one may easily become confused. An important summary of recent experience has been made by Willim,³ who brings together the experience of fifty-eight clinics, mostly German, including about 100,000 cases. *Silver nitrate* was used in from $\frac{1}{2}$ to 2 per cent. solutions, *silver acetate* in 1 per cent., *protargol* in 2.5 to 20 per cent. solutions, and *sophol* in 2 to 5 per cent. solutions. All were fairly effective. He finds that with the *silver nitrate* more is to be hoped from the rather free use of the weak solutions, $\frac{1}{3}$ to $\frac{2}{3}$ per cent., which cause little conjunctival irritation. However, he gives the preference to *sophol* in 5 per cent. solution over all the other organic salts of silver. With it, at Munich, there was one gonococcus infection in 1500 cases; at Strassburg, none in 1000 cases; at Basel, one in 3273 cases.

¹ Ophthalmoscope, vol. ix, p. 95.

² Annales d'Oculistique, vol. cx'iv, p. 435.

³ Klinische Monatsblätter für Augenheilkunde, October, 1910, p. 417

Resorcin for Chronic Conjunctivitis. The cases of chronic conjunctivitis are few as compared with the acute cases. But, apart from such conditions as trachoma and phlyctenular disease, a certain number of cases occur which seem to have originated in some acute specific form; but which, after losing their specific character, tend to persist indefinitely. In these cases, all the mineral astringents and tannin are resorted to; and the whole list of remedies may be tried without affording relief. It is in cases of this class that Knapp¹ advises the use of resorcin. He compares it especially with zinc sulphate, employing it in the same class of chronic cases. It is used in 2 or 3 per cent. solution, dropped into the eye two or three times a day. Such a solution causes a sharp, burning sensation, which gets better quickly. It tends to turn brown upon exposure, but, if made with borated water, remains fit for use a long time.

Trachoma. The so-called trachoma bodies² continue to be the subject of careful research and a vast amount of literature. The paper of Noguchi and Cohen³ is based upon the examination of over 10,000 smears and sections, from fifteen different conditions of the conjunctiva. The bodies were found in only four conditions. Supposed follicular conjunctivitis showed them in 9 cases of 250, and these all belonged to the borderland cases in which clinical differentiation from trachoma was impossible. In non-gonorrheal ophthalmia neonatorum they were found in all the cases, six in number. In gonorrheal ophthalmia of older children these bodies were found in 29 out of the 30 cases, occurring in one epidemic. In 60 cases of typical trachoma, they were found in 36, including 12 out of 15 cases in American Indians, and all of 14 cases of rather acute type. In 12 of these 14 cases there was complete restoration, usually in three or four months, but sometimes much later. In gonorrheal ophthalmia in adults and in newborn children, the bodies were absent. The authors suggest that the so-called trachoma bodies represent a conjunctival affection resembling trachoma, with acute manifestations, but not complicated by pannus or cicatricial changes.

A study very similar to the one mentioned above is reported by Bietti and Betti,⁴ based on the study of 30 cases of trachoma, and 52 other cases, including 40 of normal conjunctiva. Of 15 fresh cases of trachoma, 13 showed the bodies. Of 8 old cases, 6 showed them. Of 7 cases treated with silver nitrate, but 1 was positive. Of 3 cases of ophthalmia neonatorum, 1, due to the colon bacillus, showed the bodies. In the normal conjunctiva, and in seven other conjunctival conditions, no protoplasmic inclusions were present that could be confused with those found in trachoma.

¹ *Klinische Monatsblätter für Augenheilkunde*, January, 1911, p. 78.

² *PROGRESSIVE MEDICINE*, June, 1908, p. 321.

³ *Archives of Ophthalmology*, vol. xl, p. 1.

⁴ *Annali di Ottalmologia* vol. xxxix, p. 801.

Wolfrum¹ finds that, in the non-gonorrheal ophthalmias of newborn children, these bodies are more general and abundant than in most cases of trachoma. Only in severe neglected trachoma can a like quantity of them be found. He thinks it probable, from these inclusions, that blennorrhea and trachoma arise from the same cause.

The *sand-paper method of treating trachoma*, devised by Coover,² has been used by Martin³ in an epidemic of 60 cases occurring among boys in an orphans' home. He finds it the most satisfactory operative procedure yet devised in the treatment of trachoma. But, like other operations, it requires to be followed by specific treatment; the saturated solution of copper sulphate being most satisfactory. If the conjunctival surface be thoroughly flushed with normal salt solution and scrubbed with a 1 to 5000 bichloride solution after the operation, previous sterilization of the sand paper used is entirely unnecessary.

Dickson⁴ has used *cataphoresis*, or *iontophoresis*, for trachoma, by applying a copper electrode attached to the positive pole to the diseased conjunctiva. He uses a current of 3 to 5 milliampères, continued for as much as eight minutes, until a greenish deposit of copper in the tissue was noticeable. He reports very favorable results in 25 severe cases of long standing trachoma.

DISEASES OF THE CORNEA

Treatment of Corneal Ulcers. Several writers have now reported very satisfactory results obtained by *iontophoresis* (cataphoresis). Twenty-seven cases of purulent keratitis, suppurating or hypopion ulcer, subjected to *zinc iontophoresis* furnish the basis for a paper by Traquair.⁵ He uses as the corneal (positive) electrode a rod of pure zinc, the end of which fits into a small celluloid cap having an opening 1.5 mm. in diameter at its centre. This cap is filled with cotton wool, which projects slightly through the orifice, and is moistened with $\frac{1}{2}$ per cent. solution of zinc sulphate. He also uses a sharpened rod of zinc, with which undermined edges and deep infiltrations may be scraped out while the current is flowing. The ordinary electrode is used with 1 to 1.5 milliampères of current continued one to one and one-half minutes. For the zinc point, $\frac{1}{2}$ milliampère continued one-half minute is sufficient, as it causes more irritation. The ulcers were of a severity that would formerly have been met by use of the cautery; and the results obtained compare favorably with a series of sixty-seven cases previously treated

¹ Proceedings of the Thirty-sixth Ophthalmological Congress at Heidelberg.

² PROGRESSIVE MEDICINE, June, 1909, p. 288.

³ Ophthalmology, vol. vii, p. 219.

⁴ Ophthal'mic Record, March, 1910, p. 155.

⁵ Ophthal'mological Review, vol. xxx, p. 1.

by cauterization. Pain occurred in about half the cases. But in only one was it "really severe." It may follow the application, and last from three to nine hours, or it may come on some days afterward, when it is due to iritis. Jones¹ reports the successful treatment of Mooren's ulcer by zinc ions. He uses for the positive electrode a loop of zinc wire, or the end of a zinc rod carrying a fine web of absorbent wool dipped in a 1 per cent. solution of zinc sulphate. The current of 1 to 1.5 milliampères is applied for three or four minutes, or a little longer, if the application is made in two instalments. Patients become agitated, although they may admit the application is not especially painful. Jones states that a single good application should cause healing within a week. Traquair secured healing with one application in 21 cases, while the other 2 had three applications each.

Good results from the treatment of corneal ulcer, as well as abscess of the cornea and parenchymatous keratitis, by the use of *douches of hot air*, are reported by Rozet.² The air is heated in a copper globe over a gas flame; a temperature of 65 to 70 C. is well borne. Fractional *sterilization of serpent ulcer* of the cornea has been undertaken by Weekers.³ The platinum tip of the galvanocautery is heated to a dull red and held near, but not in contact with, the cornea for five or six minutes. The effect produced by such an exposure may be judged by repeatedly holding the cautery tip near the bulb of a thermometer; an approach that will raise the temperature 50° or 60° C. is to be aimed at. Such heating is repeated two or three times, the surface being moistened between with salt solutions.

Dean⁴ claims to have cured one-half his cases of hypopion keratitis without resort to the Saemisch incision or the galvanocautery. He uses *hydrogen peroxide* by dipping an applicator, wound with absorbent cotton, into the full strength of the drug, and applying the tip to the ulceration, and holding it there a few seconds to allow penetration to the deeper layers of the cornea. The application is made after cocaineizing the eye, and is generally repeated daily.

Ring Abscess of Cornea. Tertsch⁵ reports 5 cases of this condition following accidental or operative trauma; and one occurring with choroidal sarcoma. He finds it to be part of a severe pathological change in the interior of the eye, evidence of such change being necessary to the diagnosis. In a case reported by Cramer,⁶ the infiltration ring was located at Descemet's membrane. The ciliary body, choroid, retina, and vitreous were affected. In a case reported by Patterson,⁷ recovery

¹ British Medical Journal, 1910, vol. ii, p. 526.

² Klinische Monatsblätter für Augenheilkunde, November-December, 1910, p. 705.

³ Bulletin d'Opht. Belge., No. 28, p. 70. ⁴ Ophthalmic Record, vol. xix, p. 295.

⁵ Graefe's Archiv für Ophth., vol. lxxiii, p. 314.

⁶ Klinische Monatsblätter für Augenheilkunde, May and June, 1910, p. 620.

⁷ Ophthalmic Record, vol. xix, p. 284.

occurred after four injections of a stock vaccine of *Staphylococcus aureus*, and the cornea partly cleared and vision improved to counting fingers.

Dystrophy of Corneal Epithelium. Under the name of dystrophy epithelialis corneæ, a special pathological condition is described by Fuchs,¹ who has encountered 13 cases of the kind. It attacks elderly people, more frequently women (9 cases). The eye is otherwise healthy (10 cases), or it may be affected by increase of intra-ocular tension (3 cases). Loss of vision first attracts attention, and there may be slight evidence of inflammation. The sensibility of the cornea is greatly diminished. A superficial diffuse opacity, most dense near the centre of the cornea, is found upon examination; and this gradually increases for years. Finally, a sharply marked, gray opacity forms in front of the pupil, somewhat raised above the level of the cornea. This is due to new-formed connective tissue between Bowman's membrane and the epithelium. No treatment has been of benefit. Since the appearance of Fuchs' paper, an additional case has been reported by Bergmeister,² occurring in a woman aged forty-two years, without increase of intra-ocular tension.

Keratitis with Acne Rosacea. In reporting a case of this condition, Holloway³ points out that in many cases of the kind the corneal lesion may yield to treatment, and the case remain unreported because the connection with the skin disease is unrecognized. The condition is seen more frequently in women than men, in the proportion of about five to one; and all the patients have been over forty years of age when seen, except Holloway's, who was a woman, aged twenty-nine years, and the eye had been first attacked three years before. The corneal lesions vary from small superficial ulcers near the limbus, to extensive vascular infiltration of the cornea; and even to complete corneal opacity. They are characterized by obstinacy and tendency to recur and the co-existence of the ordinary lesions of rosacea upon the skin of the face. They have frequently been associated with disturbances of menstruation. Digestive disturbances are also closely associated with this condition. Sometimes the corneal disease has been complicated by iritis. The treatment includes the various measures resorted to for severe keratitis, especially atropine and cauterization of ulcers or infiltrates. Holloway agrees with others who have recently written upon this subject that instillations of holocain have an especially favorable influence.

Phlyctenular Keratitis. Since tuberculosis has been recognized as the cause of most "scrofulous" affections, the relation of the tubercle bacillus to phlyctenular ophthalmia has been much discussed. Rosen-

¹ Graefe's Archiv für Ophth., vol lxxvi, p 487.

² Centralblatt für praktische Augenheilkunde, December, 1910, p. 361.

³ Archives of Ophthalmology, vol. xxxix, p. 321.

hauch,¹ among 50 cases tested for the tubercular skin reaction, with the Moro salve, obtained a positive reaction in 48. Bywater² obtained the reaction in all of 15 cases. Weekers³ found the von Pirquet test positive in 142 out of 156 children.

Stephenson⁴ observed other evidence of tuberculosis in 214 out of 669 patients. In slightly more than half his cases, eczema co-existed with the phlyctenular disease. Weekers' microscopic studies show that the ocular phlyctenule is absolutely different from the vesicle of eczema. Like other observers, he has failed to find the tubercle bacillus in the phlyctenule; but he does identify it with the tuberculides, both clinically and structurally. Rosenhauch concludes that phlyctenular inflammation is due to the joint action of a toxin of the tubercle bacillus, and some external microbic influence, especially that of the yellow pyogenic staphylococcus. Lafon⁵ attaches more importance to the occurrence of phlyctenular disease after measles, and in connection with gastro-intestinal auto-intoxication. As an obvious corollary, he insists upon the importance of dietetic measures, as well as general treatment.

Keratomalacia. From a study of 30 cases seen in London, Stephenson⁶ finds that this condition occurs in children between the ages of three and twenty months, being most frequent in the eighth month of life. In one-half the cases, both eyes are affected; and one-half the patients die, usually of bronchopneumonia, or exhaustion. It leads to blindness in one-half the children. It occurs chiefly in the children of the poorer classes, whose vitality has been seriously reduced by zymotic enteritis, congenital syphilis, malnutrition, or tuberculosis, in the order named. Its seasonal occurrence corresponds closely to that of enteritis. The *treatment* of the general condition is most important, especially provision of a wet-nurse, if possible, or a carefully prepared diet of milk, with lime water. Stephenson has also found alcohol beneficial, and cod-liver oil. To these must be added the specific treatment of syphilis, or tuberculosis, if indicated. Locally, heat, hydrogen peroxide, and physostigmine are of value; and, if the eye does not properly close, the lids may be drawn together by fastening a strip of gauze to each with collodion, and drawing together with a gathering string.

Treatment of Old Corneal Opacities. This is commonly attempted by optical iridectomy, the results of which are apt to be disappointing unless the case has been very carefully selected. *Dionin* is recognized as valuable in the treatment of recent opacities, but Brown⁷

¹ Graefe's Archiv für Ophth., vol. lxxvi, p. 370.

² Ophthalmoscope, vol. viii, p. 492.

³ Académie de Médecine de Belgique, vol. xxiii, No. 9.

⁴ Medical Press and Circular, April 27, 1910.

⁵ Archives d'Ophthalmologie, vol. xxx, p. 444.

⁶ Ophthalmoscope, vol. viii, p. 782.

⁷ American Journal of Ophthalmology, vol. xxvii, p. 183

reports a case in which the opacity had been present eighteen years. After instillation twice daily of one drop of a 5 per cent. solution of diosmin, continued for six weeks, vision rose from $\frac{5}{27}$ and $\frac{5}{60}$ to $\frac{5}{9}$ partly. Moret¹ reports 2 cases treated by *atomized sulphurous water*. One patient, aged forty-five years, had a hazy cornea from childhood. Vision improved from $\frac{5}{10}$ to $\frac{8}{10}$. A boy, aged three and one-half years, had total leukoma from corneal ulceration at the age of one month. His cornea cleared up so that the iris became completely visible. In these cases the eyes were exposed to the sulphurous spray for five minutes every second day. This was followed by a marked reaction. Moret prefers the water of Challes, in Savoy, as containing the largest proportion of sulphur, in the forms of sodium monosulphide and hydrogen sulphide. If too strong, it may readily be diluted.

Marginal Degeneration of Cornea. This condition, described by Fuchs, is regarded as essentially similar to the peripheral groove formation of Schmidt-Rimpler. Van Duyse² reports a case under observation for fifteen years, in which there first appeared a groove at the upper margin of the cornea, which was followed by a bulging, vascularization, and slight opacity, with symptoms of slight inflammation. The corneal surface became distorted, and vision was reduced by a cataract. Van Duyse points out that minor degrees of this condition may be readily overlooked, and that it should be considered in connection with proposed extraction of cataract.

Zentmayer³ reports a case occurring in a comparatively young woman, aged forty-eight years, in which the lesion was a well-marked groove encircling the margin of the cornea, except about 15 degrees down and in. At several points the conjunctiva was drawn over onto the cornea, and there were pin-point yellowish dots, probably of hyaline degeneration.

Fisher⁴ reports a case occurring in a still younger woman, aged forty-one, who gave a history of inflammation fifteen years before. The corneal curvature was greatly distorted by stretching of a crescent at the upper margin. The anterior chamber was much deeper than normal in the upper part. Fisher subsequently operated on one eye, removing a crescent of extremely thin tissue forming the upper part of the corneal flap. Healing was very slow, but vision, which had been $\frac{6}{60}$, came up to $\frac{6}{18}$ with a concave lens.

THE UVEAL TRACT

Iritis. The *etiology* of iritis has been the subject of a discussion in the *British Medical Journal*.⁵ The views expressed show striking diversity as

¹ Archives d'Ophthalmologie, vol. xxx, p. 366.

² Ibid., p. 657.

³ Annals of Ophthalmology, vol. xx, p. 90.

⁴ Transactions Ophthalmological Society of the United Kingdom, vol. xxx, p. 25.

⁵ British Medical Journal, July 23, August 13 and 27, 1910.

to the frequency of different causes. Campbell, from his own observations, found the following percentages: Caused by syphilis, 70 per cent.; gonorrhea, 20 per cent.; alimentary, uterine, and tubal infections, 9 per cent.; tuberculosis, 1 per cent. This differs strikingly from the figures quoted last year.¹ In strong contrast also is the experience of Worth, who found that in less than 30 per cent. of his cases seen in private practice was there any reason for suspecting syphilis; while in more than one-half septic intoxication from constipation, indigestion, decayed teeth, etc., was regarded as the cause. Butler agrees with Worth that at least 50 per cent. are due to septic intoxication, but feels convinced that tubercular toxemia plays an unsuspected part in many cases. He does not agree with Campbell that bilateral iritis is always syphilitic; and points out that gonorrheal iritis is frequently bilateral. Among the causes of purulent iritis, Ball² recognizes acute infectious diseases, embolism, puerperal septicemia, and pyemia. Genet³ ascribes a slow inactive form of iritis to ozena.

Spontaneous Atrophy of Iris. A case of this character is reported by Wood.⁴ When first seen, noticeable atrophy of the iris had been progressing for three and one-half years; there was no evidence of any other pathological condition about the eye. The iris continued to atrophy, and soon afterward increased tension of the eyeball was noticed. The atrophy continued for two years, the tension rose, and vision was gradually reduced to perception of light. The eyeball was removed for the glaucoma. Microscopic examination showed chronic plastic iridocyclitis and degeneration of the central retinal artery. Harms,⁵ who had previously reported a similar case, has now had the opportunity to demonstrate the later changes, the eye having been removed for absolute glaucoma. In a case reported by Goldberg,⁶ the patient had received severe injury to the head and eyes, and apparently the atrophy extended throughout the whole uveal tract.

Uveal Tuberculosis. From the histological findings in a case of tuberculous cyclitis, Verhoeff⁷ elaborates a theory as to the origin of tuberculous scleritis and keratitis. He believes that, in the former (anteronodular scleritis), the infecting bacilli are derived chiefly from the superficial vessels of the ciliary processes, and are carried in the aqueous to the filtration angle. In tuberculous keratitis, the infection is also from the aqueous humor. Verhoeff would also distinguish two forms of tuberculous cyclitis—an interstitial, spreading from the affected sclera,

¹ PROGRESSIVE MEDICINE, June, 1910, p. 335.

² Oklahoma Medical News, September, 1910.

³ La Clinique Ophthalmologique, November, 1910, p. 555.

⁴ Ophthalmoscope, vol. viii, p. 158.

⁵ Klinische Monatsblätter für Augenheilkunde, July, 1910, p. 123.

⁶ Annals of Ophthalmology, vol. xix, p. 457.

⁷ Transactions American Ophthalmological Society, vol. xii, Part 2, p. 566.

and a superficial cylitis, from direct metastases. There may also be a superficial tuberculous iritis involving the posterior surface of the iris.

Koller¹ reports 3 cases of recurrent tubercular choroiditis. In the first, the interval between the two attacks was about three years; and, at the time of the first attack, two old atrophic choroidal areas were noted. In the second case, six weeks after the first attack, when a pigmented border was beginning to appear about the patch affected, fresh opacity appeared, but cleared up. Eleven months later another distinct renewal of visual disturbance occurred. Koller finds that the foci of disease of the chronic tubercular type have a characteristic distribution; not widely disseminated like syphilitic choroiditis, or in large atrophic patches, as with myopia. They occur singly, or as a confluent group or chain of foci, in one region, and not all in the same stage of the process. Such distribution of the lesions is also illustrated by a case reported by Ginsberg,² in which the clinical history and symptoms were confirmed by postmortem and microscopic investigations. In this case, three separate foci were visible near the optic disk, presenting different stages of development.

A case is reported by Stephenson³ after two years' interval. The tubercle bacilli were found in the aqueous withdrawn from the affected eye, and positive reactions were obtained by the tuberculin tests applied to the conjunctiva and skin. The patient, having been first seen when suffering from acute tubercle of the choroid, proved it possible for such a patient to be apparently in good health several years after. Fejer⁴ has also exhibited a case of tuberculosis affecting the choroid and other organs; two years later the same patient had recovered from all the tubercular lesions, with vision of $\frac{5}{7}$, under the administration of tuberculin.

Panophthalmitis. The pathogenic capabilities of certain organisms have been referred to above in the paragraph on bacteria of the conjunctiva. Their presence is not unusual in panophthalmitis. The pneumococcus, bacillus subtilis, and streptococci may be the active germs in a general inflammation of the uveal tract. Even the white staphylococcus may cause a subacute panophthalmitis. Other bacteria less generally recognized must also be reckoned with. In this connection, James⁵ reports a case in which a large Gram-positive motile bacillus proved extremely malignant in the eye, to which it gained access through a wound of the upper lid, and also when injected into the guinea-pig. Besides great chemosis and swelling in the orbit, the man had become extremely ill within forty-eight hours after the injury. He gradually

¹ Transactions American Ophthalmological Society, vol. xii, Part 2, p. 586.

² Graefe's Archiv für Ophth., vol. lxxiii, p. 538.

³ Transactions Ophthalmological Society of the United Kingdom, vol. xxx, p. 77.

⁴ Annals of Ophthalmology, vol. xx, p. 188.

⁵ Transactions Ophthalmological Society of the United Kingdom, vol. xxx, p. 179.

recovered after the loss of the eye. Lutz¹ reports 3 cases in which the eyes were lost, 2 infected by the staphylococcus aureus, and 1 due to metastatic meningococcus infection. In the latter case the circular infiltration (see ring abscess of cornea) occurred. Augstein² saw a case in which, as in one of the cases reported by Lutz, the panophthalmitis followed from a furuncle on the neck, probably due to staphylococcus and streptococcus infection; and he quotes 3 cases of the kind previously reported.

Bersin,³ experimenting on rabbits with *Bacillus pyocyaneus* and *Staphylococcus aureus* injected into the blood, found that endogenous infection of the eyes was favored by hunger. The frequency of the infection was proportioned to the hunger, as indicated by loss of body weight. The amount of water taken did not seem to influence the liability to ocular involvement.

Sympathetic Ophthalmia. Sympathetic inflammation is one of the possible outcomes that every surgeon has to consider when undertaking an operation upon the eyeball, such as iridectomy for glaucoma, or cataract extraction with iridectomy, or which may be followed by prolapse or incarceration of the iris. An especial danger of such a calamity seems to attach to use of the cautery in treating iris prolapse. Gifford⁴ reports a case of the kind, and mentions 12 similar cases that have been previously reported. He also cites the observation that burned tissues more readily favor infection in the abdominal cavity, or invasion by the tetanus bacillus. On account of this danger of sympathetic ophthalmia, he thinks no iris prolapse should be treated by a hot metal cautery, unless a protecting conjunctival flap can be made to adhere to the area cauterized. It is probably safer to leave the prolapse undisturbed. The finding of the xerosis bacillus in eyes causing sympathetic ophthalmia has been noted above in speaking of the bacteria of the conjunctiva.

GLAUCOMA

Pathogenesis. The relation of arterial blood pressure to glaucoma has been the subject of several papers in the last few years. Most observers have reported increased blood pressure in a very large proportion of their glaucoma cases. A different experience is recorded by Kraemer.⁵ In 49 cases of glaucoma, he found that 22 had normal blood pressure, and in 7 it was subnormal. In only 16 (35.6 per cent.) was the blood pressure 130 mm. or upward, the highest being 180 mm. In 90 patients, of similar age, he found the blood pressure increased

¹ *Klinische Monatsbl. f. Augenh.*, May-June, 1910, p. 636.

² *Ibid.*, p. 631.

³ *Ibid.*, November-December, 1910 p. 731.

⁴ *Journal of the American Medical Association*, 1910, vol. ii, p. 386.

⁵ *Graefe's Archiv für Ophthalmologie*, vol. lxxiii, p. 349.

in 30 patients ($33\frac{1}{3}$ per cent.), the highest being 160 mm. He concludes that there is no relation between the arterial pressure and the increased tension of the eyeball.

A case of obstruction of the central vein of the retina with glaucoma, studied by Inouye,¹ showed inflammation with only partial occlusion of the filtration space. The venous occlusion was due to proliferation of endothelium and subendothelial tissues. The glaucoma probably followed the obstruction. Inouye suggests that the connection between the two processes is that the obstruction causes retinal hemorrhage, and the blood corpuscles disintegrating produce toxins. These toxins are continually carried to the angle of the anterior chamber, causing the tissues about the angle to become inflamed and adherent. Menacho² believes that optic neuritis is frequently an early symptom of glaucoma, and that it is caused by vascular degeneration.

Diagnosis. The results of experimental work with the *tonometer* of Schiotz were alluded to last year.³ Good descriptions of this instrument by Marple⁴ and Cridland⁵ are now accessible in English. These, and other writers, attach importance to it as an instrument of precision in clinical work, and it seems likely to be generally appealed to in the diagnosis of doubtful cases of glaucoma. Hamburger⁶ demonstrated that, in acute glaucoma, the internal administration of fluorescein does not produce discoloration of the aqueous, even after some hours, while in iritis the aqueous shows a distinct greenish discoloration within thirty minutes.

Treatment of Glaucoma. *Iridectomy* must still be regarded as the most important curative treatment of glaucoma, and *the miotics*, pilocarpine and eserine, as useful temporary expedients. But these measures are so frequently ineffective that others are to be greatly desired. Thomas and Fischer,⁷ on theoretical grounds, used *subconjunctival injections of a solution of sodium citrate*, about 5 per cent., to reduce the intra-ocular tension in 5 cases of glaucoma. They do not put the method forward as a cure for glaucoma, but they found it effective in reducing the tension, and believe it may assist to bring about a cure. Heller⁸ reports 3 cases in which such injections seem to cause a relief from all symptoms, and this relief continued while the patients remained under observation. Happe⁹ had a different experience, and arrives at an opposite conclusion. Using the tonometer to estimate the intra-

¹ Royal London Ophth. Hosp. Reports, vol. xviii, p. 24.

² Archives de Ophthalmol., vol. x, p. 15.

³ PROGRESSIVE MEDICINE, June, 1910, p. 333.

⁴ Transactions American Ophthalmological Society, vol. xii, p. 553.

⁵ Ophthalmoscope, vol. viii, p. 640.

⁶ Centralblatt für praktische Augenheilkunde, February, 1910, p. 39.

⁷ Annals of Ophthalmology, vol. xix, p. 40.

⁸ Ibid., p. 707

⁹ Arch. für vergleich. Ophth., vol. i, p. 317.

ocular pressure, he found the tension increased by such injections more frequently than it was diminished.

The value of the *Turkish bath* in the treatment of acute glaucoma is emphasized by Brav,¹ who combines with it the use of eserine and posterior sclerotomy, which he regards as the operation to be chosen rather than iridectomy. Various operative procedures, *sclerectomy*, *trephining the sclera*, *iridencleisis*, and *iridotaxis*, etc., for the treatment of glaucoma have recently been proposed. They may be considered as promising and properly on trial. But the final results of such operations are so important in arriving at a proper estimate of their value, that they can yet only properly claim the attention of those who are investigating their usefulness and importance.

THE CRYSTALLINE LENS AND VITREOUS

Family Cataract. The longest and most complete family pedigree of a single form of cataract, yet reported, was brought before the Ophthalmological Society of the United Kingdom by Priestley Smith,² and discussed by Doyne, Nettleship and other members. This pedigree has been studied through seven generations, in the last four of which the cataract has appeared. The form is that of a disk opacity, placed deeply in the lens directly back of the pupil. It leaves the patients' vision sufficient for ordinary occupations; but they see best only when the eyes are shaded to secure dilatation of the pupil. This is the form that has been called "Coppock" cataract, because first studied in the Coppock family by Doyne, and later by Nettleship and Ogilvie. Smith proposes to call it Doyne's discoid cataract. It is possible that the family studied by Smith is related to the Coppock family, since the maternal ancestors of the man first affected were not traced. Doyne, who has followed cases of the sort for twenty-three years, thinks that in some of them the cataracts grow more dense with advancing years, but he admits that the diminution of the pupil with age might cause the visual impairment noted. In this new pedigree, the affected families included 51 descendants of whom information was obtained, and, of these, 26 were affected. The defect seems to follow the law of Mendel, having the character of a dominant. No member of the family, free of the defect, transmitted it to descendants, while about one-half of the children of those affected presented the defect.

This peculiar form of cataract has been reported a few times in families unrelated to those above mentioned. Harman³ reports a family in which 2 out of 4 children were thus affected. Nettleship has

¹ *Therapeutic Gazette*, November, p. 781.

² *Transactions Ophthalmological Society of the United Kingdom*, vol. xxx, p. 37.

³ *Ibid.*, p. 30.

seen a family in which some had this typical discoid opacity, while others exhibited lamellar cataract, showing there was no absolute distinction between the two forms. Harman has also reported ten pedigrees of lamellar, coralliform, discoid, and posterior polar cataract. In general, family cataract appearing in early life is stationary or nearly so. Hence this discovery of a similar defect in others of the family may be of practical value as regards prognosis.

Cataract from Electric Injury. Bichelonne,¹ who reports a case of cataract from a current of 30,000 volts, has collected six others from the literature. He finds that lens opacity only arises when one of the points of contact has been close to the eye. Hence it is usually confined to the side receiving the principal shock. Robinson,² however, reports three cases in which both eyes were affected. In one, the cataract remained partial in both. In another, both lenses became entirely opaque and were removed; and in one case one cataract became total and was removed, the other remaining partial.

Robinson emphasizes the extremely practical point that these opacities of the lens may not be noticeable for some weeks after the injury, and may cause complete blindness much later. In one patient it was a month before any disturbance of sight was noticed, and after a year the opacity began to increase rapidly in one eye. In the second case it was eighteen months before the changes in the lens were very noticeable, although there had been vitreous opacities from the time of the accident. The third case also came under observation at the end of eighteen months. But there had been some blurring of sight from the first. Komoto³ reports 2 cases, one of which was first seen at the end of five months, with vision of $\frac{6}{60}$ in the affected eye, after which time the whole lens became opaque. In the other case, vision began to diminish in one eye at the end of six months, and in the other at the end of a year. In all the above cases in which the cataract was subsequently removed, good vision was restored. A case in which both eyes were involved is reported by Dalen.⁴ The cataract caused by electric injury usually has a characteristic appearance. The opacity appearing as numerous white, rounded dots in or beneath the anterior capsule.

Absorption of Cataract. It is established that a general haziness of the crystalline lens may clear up under rest of the eyes and general hygienic measures, with or without local treatment. But there has been more doubt with regard to the clearing up of the distinct striae of opacity, such as characterize early cortical cataract. Within the past year, three observers report the clearing up of such striae. Becker⁵

¹ *Annales d'Oculistique*, vol. cxliv, p. 108.

² *Ophthalmic Record*, vol. xix, p. 165.

³ *Klinische Monatsblätter für Augenheilkunde*, February, 1910, p. 126.

⁴ *Mitteilungen aus der Augenkl. der Carolinischen med. Chirurg. Instituts zu Stockholm*, 1910.

⁵ *Wochenschr. f. Therap. und Hygiene des Auges*, January 13, 1910.

had a patient and personal friend, aged sixty years, who presented marked striæ, and in whom, two years later, he was unable to detect any opacity whatever. No treatment was given beyond prescribing the proper lenses. Wiegmann's patient was a youth, aged nineteen years, with chronic uveitis¹ and vitreous opacities, as well as peripheral striæ in the lens. Under the active use of mercury, both lens and vitreous cleared up entirely, and vision became normal.

The report of MacWhinnie's case² is accompanied by the reproduction of sketches by Würdemann, showing the extent of the opacity in each eye. The patient, a man, aged forty years, gave a history of specific infection four years previously. Under daily injection of benzoate of mercury for twenty days, the sectoral opacity entirely disappeared in one eye, and diminished 50 per cent. in the other.

Hallucinations with Cataract. Prolonged blindness from cataract not rarely causes a mild form of senile dementia, from which the patient recovers after the sight has been restored after operation, as in a case recently reported by Fernandez.³ Gonzalez⁴ reports the case of a patient who suffered from a great variety of visual hallucinations, some agreeable, some horrifying, although she fully realized the character of the phenomena. Both eyes were operated upon, and the hallucinations ceased. After the operation on the first eye, however, there were no hallucinations while it was open and could see clearly. But when it was covered with a dressing, or even while being washed, so that the fluid interfered with vision, the more elementary appearances of embroideries, laces, etc., returned. Gonzalez believes the vague luminous impressions received by the retina, and transferred to the centres through the ordinary paths, called up remembered images which constituted the hallucinations. Occasionally, the excitement attendant upon the removal of a cataract seems to overthrow the mental balance of the patient. Hill⁵ reports a patient who, the fifth day after a successful extraction, refused food because of hallucination, and began to have a mild, talkative delirium. This continued, with marked general enfeeblement and some rise of temperature, to death on the tenth day.

THE RETINA, OPTIC NERVE, AND TRACTS

Spasm of Retinal Arteries. This has been previously discussed,⁶ but, on account of its importance, it deserves the attention it continues to attract. The cases now reported serve to illustrate its significance.

¹ Wochenschr. f. Therap. und Hygiene des Auges, February 3, 1910.

² Ophthalmic Record, vol. xix, p. 228.

³ Anales de Oftalmologia, vol. xii, p. 154.

⁴ Annals of Ophthalmology, vol. xix, p. 432.

⁵ Ophthalmic Record, vol. xix, p. 321.

⁶ PROGRESSIVE MEDICINE, June, 1907, p. 360.

The further history of the case he had reported is now placed on record by Harbridge.¹ After five years, vision continues normal and there has been no recurrence of the attacks, but there is a moderate amount of arteriosclerosis, and there is loss of various nerve reflexes. In one of two other cases also reported, there was arteriosclerosis. In this case, the obscuration was hemianopic. It occurred frequently for fourteen months, after which the patient had remained free from such attacks for four years. In the third case, the blindness was permanent, and, while the patient gave no evidence of arteriosclerosis, she died with symptoms of uremia. Knapp² reports a series of five cases, and concludes that intermittent closure of healthy retinal arteries may occur without any lasting effect upon vision. With disease of the retinal vessels, intermittent closure is of grave significance, as the vessel may remain obstructed. Patients presenting retinal arteriosclerosis, especially if obscurations have occurred, should be placed upon rigid general regimen, and treatment for the arterial condition. In a case reported by Bruns,³ occurring in a young girl, it was difficult to draw a line between retinal spasm and anemia. The arteries were greatly reduced in both retinas. Slow gradual improvement occurred; and twenty months afterward, with good general health, her vision was quite normal.

Relation of Retinal to Cerebral Vascular Disease. A valuable study of this subject is published by Geis.⁴ It is based upon 250 cases examined with the ophthalmoscope by Uhthoff, which were subsequently followed until death, or for a period of at least five years. Geis concludes that a definite sclerosis in the retinal arteries indicates disease of the cerebral vessels, with liability to softening or hemorrhage, that gives grave prognostic significance to the ophthalmoscopic findings. Sudden occlusion of the central retinal artery in a patient of over forty years of age, without a related heart lesion, points to retinal arteriosclerosis. Venous thrombosis, in 40 or 50 per cent. of cases, was the forerunner of cerebral angiosclerosis, although the latter sometimes became evident only after from nine to twelve years. Retinal hemorrhage, in arteriosclerosis, diabetes, and chronic nephritis, usually preceded cerebral hemorrhage. But this prognosis did not attach to isolated macular or pre-retinal hemorrhage, or to retinal hemorrhage with syphilis.

Retinal Lesions with Cranial Injuries. Purtscher⁵ has reported a series of cases, and one is added by Koerber,⁶ in which, following severe cranial injuries, fractures, certain retinal changes have been observed with the

¹ *Annals of Ophthalmology*, vol. xix, p. 448.

² *Transactions Section on Ophthalmology American Medical Association*, 1910, p. 99.

³ *Transactions American Ophthalmological Society*, vol. xii, p. 535.

⁴ *Klinische Monatsblätter für Augenheilkunde*, January, 1911, p. 1.

⁵ *Transactions of the Thirty-sixth Ophthalmological Congress*, Heidelberg.

⁶ *Centralblatt für praktische Augenheilkunde*, December, 1910, p. 355.

ophthalmoscope. With irregularities in the caliber of the retinal arteries, one or more whitish or grayish rounded spots, with indefinite margins, were observed. These were mostly to the temporal side of the optic nerve entrance. Sometimes there was retinal hemorrhage, but usually not. These spots were ascribed to effusion of lymph from ruptures of the lymph channels. At a later stage, other conditions, such as optic atrophy, developed in some cases. The retinal change caused temporary impairment of vision, but was sometimes followed by complete recovery.

Toxic Amblyopias. Amblyopia with dilated pupils, central scotoma, blurring and hyperemia of the optic disks, in a case reported by Stieren,¹ is ascribed to the use of *heroin*, in the form of a nostrum taken to overcome the morphine habit. Stopping of the drug, with eliminative and supporting treatment, restored good vision in about one month. Baxter² reports a case of blindness, in a girl, aged five years, following the taking of one-half grain of *santonin* in two drams of castor oil. The general symptoms of santonin poisoning were especially severe; the child lay for two days as if dying.

The apparent safety of salvarsan as regards the production of amblyopia or optic atrophy has already been referred to. But the other preparations of *arsenic*, used in the treatment of syphilis, continue to add to the record of cases of blindness. Clarke³ reports 2 cases in which *soamin* and *orsudan*, two of the arylarsonates used in the treatment of syphilis, had caused optic atrophy. As he points out, the risk of blindness is a different matter in the treatment of this disease from the risk of blindness from such a fatal disease as sleeping sickness. In the discussion of Clarke's paper, other cases were reported. A striking case of blindness from *soamin* is also narrated by Henderson,⁴ and several cases of optic atrophy following the use of *arsacetin* have been reported in Germany and Russia.

Optic Neuritis. Retrobulbar optic neuritis, formerly one of the most obscure conditions, is coming to be better understood. Reference was made last year⁵ to the cases arising from *disease of the nasal accessory sinuses*. Since that time numerous similar cases have been reported. The practical point that its symptoms can be used in the diagnosis of doubtful diseases of the nasal accessory sinuses, is brought out by von der Hoeve.⁶ He calls attention especially to the enlargement of the physiological blind spot, which he thinks justifies operative exploration of the sinuses in the absence of other symptoms. This involve-

¹ Journal of the American Medical Association, vol. liv, p. 869.

² Lancet, 1910, vol. ii, p. 1693.

³ Transactions Ophthalmological Society of the United Kingdom, vol. xxx, p. 240.

⁴ American Journal of Ophthalmology, vol. xxvii, p. 336.

⁵ PROGRESSIVE MEDICINE, June, 1910, p. 343.

⁶ Archiv f. Augenheilkunde, vol. lxxvii, p. 101.

ment of the peri-papillary fibers he ranks with disturbance of the papulo-macular bundle, as especially liable to occur with sinus disease.

Optic neuritis, in connection with the *acute specific fevers*, is of considerable importance. Nacht¹ records the case of a girl, aged seven years, who suddenly became blind while suffering from *whooping cough*. There was swelling of the optic disk and some retinal hemorrhage. Trephining was done and prompt improvement followed, vision in one eye rising to normal. Vossius² reports two cases; one in a girl, aged twelve years, suffering from *rötheln*, who recovered almost normal vision in four months. The other was in a woman, aged thirty-four years, who had three attacks of optic neuritis at intervals of eight months and three months, occurring with attacks of *influenza*. In this case also good vision was recovered. In a case of optic atrophy reported by Jacqueau, following *mumps*, the appearances indicated a previous neuritis.

Family Optic Atrophy. Hereditary optic atrophy usually affects men in early adult life, but Nakamura³ reports a family of twelve members, in which ten, two boys and eight girls, were affected between the ages of seven and twenty-one years. There was central scotoma in all, and, in most, some narrowing of the peripheral field. Komoto⁴ reports a family in which two brothers were affected. The younger, aged fourteen years, recently attacked, showed slight hyperemia of the optic disk. By minute study of the visual field in two cases, Rönne⁵ finds that the scotoma has a horizontal radiating boundary corresponding to the distribution of bundles of nerve fibers. From this he concludes that the atrophy arises from a focus of disease in the optic nerve. But he admits that with central fixation lost, the fields cannot be very accurately mapped by Bjerrum's method.

Tuberculosis of Optic Nerve. A case of tuberculosis of the orbit, involving the optic nerve, is reported by Birch-Hirschfeld.⁶ He concludes that optic nerve involvement may occur at first without impairment of central vision, or evidence of ophthalmoscopic changes. Later, a peripheral optic atrophy may become apparent. Igersheimer⁷ also concludes that tuberculosis may be an etiological factor in acute retrobulbar neuritis, and he ascribes credit for the prompt recovery of a case to injections of tuberculin T. R. Axenfeld⁸ has reported a case of solitary tubercle of the optic papilla.

Pituitary Disease Affecting the Optic Tract. Disease of the hypophysis is not so rare as reported cases might lead one to suppose, and the

¹ Klinische Monatsblätter für Augenheilkunde, May, 1910, p. 645.

² Beiträge zur Augenheilkunde, Heft lxxv, p. 252.

³ Klinische Monatsblätter für Augenheilkunde, March, 1910, p. 411.

⁴ Ibid., p. 412.

⁵ Ibid., March, p. 331.

⁶ Zeitschrift f. Augenheilkunde, vol. xxiv, p. 193.

⁷ Klinische Monatsblätter für Augenheilkunde, September, 1910, p. 406.

⁸ Münchener med. Wochenschrift, 1910, p. 2823.

symptoms caused by involvement of the optic tracts are among the most definite and suggestive symptoms by which such disease may be recognized. Lapersonne and Cantonnet,¹ who report a case of their own, have studied the accounts of some 80 cases now found in the literature. Hemianopsia was found to be bitemporal in 21 per cent., and in 11 per cent. it was confined to the temporal field of one eye. In 3 of the cases, including their own, right homonymous hemianopsia occurred. Radiographs showed a definite extension of the tumor backward, so as to involve the optic tract. Optic atrophy was noticed in 46 per cent., and papillary stasis in 16 per cent. Transient obscuration of vision is common. Exophthalmos was noted seven times, and paralyzes of the various ocular muscles were found in 29 per cent.

Cargill² reports a case in which there were the well-marked symptoms of akromegaly, coming on for two years before visual impairment was noticed. The skiagraph showed extensive absorption of bony tissue in the region of the hypophysis. Two of Köllner's three cases³ showed typical akromegaly, and all had bitemporal hemianopsia, with sector defects of the field and relative scotoma. Zentmayer's patient⁴ showed some choking of the optic disk, with subsequent atrophy. There was bitemporal hemianopsia, and peripheral contractions of the field. Marlow⁵ has reported a case in which the acuteness of vision improved under the use of thyroid extract, and the improvement continued for six months. Shoemaker⁶ reports a case in which there was adenocarcinoma of the pituitary body. Impairment of vision was the first symptom. There was bitemporal hemianopsia with optic neuritis, and later optic atrophy. He regards as feasible the operation done by Hochenegg by entering through the nose, especially when the tumor is benign. The results obtained by Halstead,⁷ by an operation of this class, offer every incentive for the early and certain recognition of tumors of this region.

THE LIDS, LACHRYMAL APPARATUS, AND ORBIT

Sporotrichosis of Eyelids. Among some 80 cases of sporotrichosis that have been reported in the twelve years since this condition was recognized, Gifford⁸ finds the skin or conjunctiva of the lids to have been attacked in 6 cases. He reports a new case, with microscopic

¹ Archives d'Ophtalmologie, vol. xxx, p. 65.

² Transactions Ophthalmological Society of the United Kingdom, vol. xxx, p. 191.

³ Centralblatt für praktische Augenheilkunde, July, 1910, p. 211.

⁴ Annals of Ophthalmology, vol. xix, p. 719.

⁵ New York Medical Journal, April 16, 1910.

⁶ Archives of Ophthalmology, vol. xxxix, p. 128.

⁷ Transactions of the American Surgical Association, 1910.

⁸ Ophthalmic Record, vol. xix, p. 573.

examination and culture of the sporotrichum, and from his notes of cases seen in previous years, when no microscopic examination for this organism was made, he collects 5 other cases that he has no doubt were of this character. In one, the disease extended over upon the ocular conjunctiva at the temporal side of the globe. In 3, it was located in close relation to the lacrymal sac, and probably arose from the lacrymal passages. Gifford divides these cases into three classes: (1) Lesions in the skin with swelling of the pre-auricular and other related lymphatic glands. His lachrymal cases would form a sub-class. (2) The disease appears as yellowish nodules in the retrotarsal folds. (3) In this class he places his single case of the lesions appearing on the eyeball. In his experience, the disease tends to recovery under large doses of potassium iodide, or sometimes without such treatment.

Since the publication of Gifford's paper, Chaillous¹ has reported a case of conjunctival sporotrichosis, and Morax² has reported one of primary sporotrichosis of the lachrymal sac. In the latter there arose the symptoms of dacryocystitis, with formation of a prelachrymal abscess and enlargement of the pre-auricular and postmaxillary glands. The sporotrichum was found, and, under potassium iodide, recovery was almost complete in six weeks.

Hemorrhage into the Lids in Barlow's disease is reported by Steindorff.³ The infant was seven months old, and showed very distinct evidences of rachitis. The swelling of the lids was limited to the orbital margin. There was distinct fluctuation and marked tenderness of the orbit on pressure. The eyeball protruded, but was easily pressed back. The patient was not the child of well-to-do parents, but the mother had taken especial care to regularly boil, for a quarter of an hour, the already pasteurized milk on which the child had been fed since birth. When fed on uncooked milk the child rapidly recovered. In this case there were no retinal hemorrhages.

Chalazion. A simple procedure for removal of chalazion, which prevents it from reforming, is described by Lamb.⁴ After anesthetizing the conjunctiva, the lid is grasped with a chalazion forceps, which surround the tumor. This is incised at right angles to the lid margin. After the contents have been curetted and the bleeding checked, a strabismus hook is heated red-hot over a flame, or the electric cautery point is used to touch the interior of the sac. Lamb finds this superior to chemical caustics.

Removal of Paraffin from Lids. Coover⁵ has reported a case in which unsightly puffiness and ectropion of the lower lid had been caused by the injection of paraffin to take out wrinkles. Repeated use of the high

¹ *Annales d'Oculistique*, vol. cxlv, p. 47.

² *Ibid.*, p. 49.

³ *Zeitschrift f. Augenheilkunde*, vol. xxv, p. 180.

⁴ *Journal of the American Medical Association*, vol. lv, p. 2210

⁵ *Ophthalmic Record*, vol. xix, p. 156.

frequency current was followed by almost complete disappearance of the paraffin.

Dislocation of Lachrymal Gland. In a case of congenital luxation, reported by Jones,¹ the gland appeared as a tumor 15 mm. long by 10 mm. wide, under the ocular conjunctiva, slightly above the insertion of the external rectus. It could be readily reduced to the normal position and held there, but, on removing the finger, the tumor reappeared. Orloff² reports the case of a sailor, who fell on a blunt hook, which made a lacerated wound in the lid, without tearing the conjunctiva or eyeball. From the wound protruded a dark red, firm, fleshy mass, the size of an almond, which was connected with the deep tissues by a small pedicle. The gland was replaced in the normal position and the wound, being closed by sutures, healed by first intention. The cosmetic result was good, although the gland seemed not quite in normal position.

Operations for Lachrymal Obstruction. For over six years Toti³ has been doing the operation which he calls *dacryocystorhinostomy*. It opens a passage from the lachrymal sac into the middle meatus of the nose so that the lachrymal canaliculi empty directly into the nose. An area of the nasal mucous membrane, the lachrymal sac, and the bony wall are all removed under local anesthesia. The results have been good and, so far, permanent. Toti believes the operation should replace extirpation of the lachrymal sac. West⁴ has devised a similar operation that he calls *window resection of the nasal duct*. The opening is made above the inferior and in front of the middle turbinal, using bevel-edged chisels. He reports 6 cases, of which 4 were cured, and the other 2 improved.

Traumatic Enophthalmos. Pilcher⁵ reports 8 cases of this condition, in half of which the cause was the kick of a horse. In 5, the condition is explained by orbital fracture, with or without subsequent inflammation. In 3, it is ascribed to ischemia of the orbit of neurotic origin, and probable secondary atrophy of the adipose tissue. The degree of enophthalmos varied from 1 to 4 or 6 mm.; one of these cases of most extreme sinking, being ascribed to neurotonic ischemia. In 6 of the cases the condition had continued from six to thirty-five years. In a case reported by Sautter,⁶ there was fracture of the orbital walls at several points. The injury was received at baseball, the patient being knocked down, but not rendered unconscious. After having the wound dressed, he returned and played several innings of the game.

¹ Ophthalmology, vol. vii, p. 17.

² Klinische Monatsblätter f. Augenheilkunde, October, 1910, p. 472.

³ La Clinica Oculistica, April-May, 1910.

⁴ Transactions American Ophthalmological Society, vol. xii, p. 654.

⁵ Zeitschrift für Augenheilkunde, vol. xxiv, pp. 285, 424.

⁶ Annals of Ophthalmology, vol. xix, p. 712.

INJURIES

Chemical Injuries. A case of injury by powdered *podophyllin*, which was being handled in large quantities, is reported by Chiari.¹ The patient knew the substance was irritant, and protected his throat and nose, but not his eyes. There was intense itching, burning, and a feeling of dryness in the eyes, in spite of copious lachrymation. There was severe photophobia, and the lids were greatly swollen and reddened. The conjunctiva was hyperemic and chemosed, but free from hemorrhages. The corneas were faintly opalescent from diffuse infiltration, and the epithelium was semi-opaque and edematous. There was partial corneal anesthesia. The pupils were contracted and immobile. The deeper parts of the eye were normal, but there was an absolute scotoma extending from the physiological blind spot. The *treatment* included atropine and hot fomentations. Recovery seemed to be complete in ten days. Visual acuteness remained impaired after all external signs of irritation had disappeared. Experiments on the eye of the rabbit showed that podophyllin produces inflammatory reaction in the cornea, iris, and tissue adjoining the angle of the anterior chamber; and that the ciliary processes are swollen.

Injury by exposure to fumes of *dimethyl sulphate* is reported by Adams and Cridland.² The patient working in a laboratory had been exposed to these fumes, and had inhaled them. Four hours later his eyes began to water. The same evening they became red and painful, and "poured with water" and kept him awake at night. His nose was stopped up and running, and the senses of smell and taste were gone. Smell and taste slowly returned, but the eyes remained irritable and watery, with some photophobia. When seen after three weeks, the lids were reddened, and the ocular conjunctiva was injected and edematous. The palpebral conjunctiva was practically normal. The cornea presented normal epithelium; but deep in its substance, or on the posterior surface, were numerous fine dots, scattered over the part of the cornea exposed in the palpebral aperture. The deeper structures were normal. Atropine, with soothing applications, was used. The eyes gradually improved, and, after three months, were normal. The symptoms closely resemble those produced by experiment in the eyes of the lower animals except that when this patient was seen, the corneal epithelium had become normal, and the corneal haze was not permanent.

Injuries to the eye by *ammonia* have been studied by Pilcher,³ who reports 3 cases of his own, and has collected over 20 previously reported.

¹ *La Clinica Oculistica*, vol. xi, p. 345.

² *Ophthalmoscope*, vol. viii, p. 717.

³ *Zeitschrift f. Augenheilkunde*, vol. xxiv, p. 297.

There are photophobia, lachrymation, redness and swelling of the conjunctiva, and, in the more severe cases, the surface is covered with a white, brittle film, the removal of which leaves it devoid of epithelium. Anesthesia and haziness of the cornea are very serious symptoms, which may be followed by sloughing and perforation, iritis, and even panophthalmitis. The inflammation of the cornea and iris may set in very late, after more than a week of favorable progress. The ammonia appears to produce injury by dehydration. In experiments on the lower animals, it has been found in the aqueous humor soon after the injury. Pilcher recommends protection from deeper injury by immediate tapping of the anterior chamber. The first treatment is removal of the ammonia by very free irrigation of the conjunctiva.

Schmidt¹ reports a case in which, after slight injury of the cornea by *hydrochloric acid*, causing a transient erosion, small grayish-white opacities appeared in the anterior cortex of the lens. These were visible by oblique illumination, and caused the ophthalmoscopic image to appear slightly veiled. Vision was reduced one-half. Such injuries to the lens have been produced experimentally in the lower animals by cauterization of the cornea with various acids.

Injuries by Aniline Pencils. The general use of indelible copying pencils containing aniline violet gives practical importance to the injuries caused by bits of such pencils getting into the eye. Quite a series of cases of injury of the kind have been recorded. The worst results occurred in 2 cases reported by Dunn.² His first patient got a piece of such a pencil in his eye four days previously. At first it caused no inconvenience, then it became painful and the pain increased. When seen, the patient was beside himself with pain. The conjunctival secretion was purple, the greater part of the cornea clouded as though burned by caustic; and on the upper inner quadrant of the eyeball was a dead white area 2 mm. by 10 mm. of necrotic conjunctiva and sclera. The partially dissolved point of the pencil was found under the upper lid. After its removal, and cleansing, the eye became more comfortable. but three days later the patient returned with intense pain and other evidences of panophthalmitis, and the eye was enucleated. In the other case the pencil had also been retained for four days; there was terrible suffering, and enucleation became necessary.

In the case reported by Snell³ the patient was seen an hour after the accident, which had caused a laceration of the bulbar conjunctiva. There was severe photophobia, lachrymation, and edema; and the conjunctiva was stained a deep purple. The cornea looked steamy, and the lower part of the aqueous appeared darkly stained, somewhat resembling a hyphema. Under treatment, the eye promptly improved.

¹ Zeitschrift f. Augenheilkunde, vol. xxiv, p. 241.

² Archives of Ophthalmology, vol. xxxix, p. 120.

³ Annals of Ophthalmology, vol. xix, p. 216.

On the fourth day pain had disappeared, and by the ninth day no trace of the aniline color remained.

The *treatment* should include irrigation with a 5 to 10 per cent. solution of tannic acid, to render insoluble and remove the aniline, and the general treatment for such an inflammation. In a milder case reported by Libby¹ the pencil point was removed in one-half hour. The outer two-thirds of the ocular conjunctiva was stained a dark blue, the largest veins being blue black, and the inner third a paler blue. Three irrigations of hydrogen peroxide (3 per cent.) were made that evening, and two the next morning, restoring the natural color of the tissues. Rather severe conjunctivitis developed on the second day, but disappeared by the sixth day.

X-ray Examination for Foreign Body. Randolph² insists upon the importance of prompt x-ray examination in cases of penetrating wounds of the eyeball, when the foreign body can neither be seen nor accounted for. The vision may be normal, and the apparent injury very slight. If the foreign body were at once detected and removed, the prognosis would be quite favorable. But where it remains undetected until infection has caused an inflammation, the prognosis is apt to be absolutely bad. He cites cases in which very small foreign bodies, quite overlooked immediately after the injury, rapidly caused destruction of the eyeball. Routine x-ray examinations in such cases would often show no foreign body present. But, on the other hand, a considerable number of eyes might be saved by them.

¹ Ophthalmic Record, vol. xix, p. 99.

² Ibid., p. 341.

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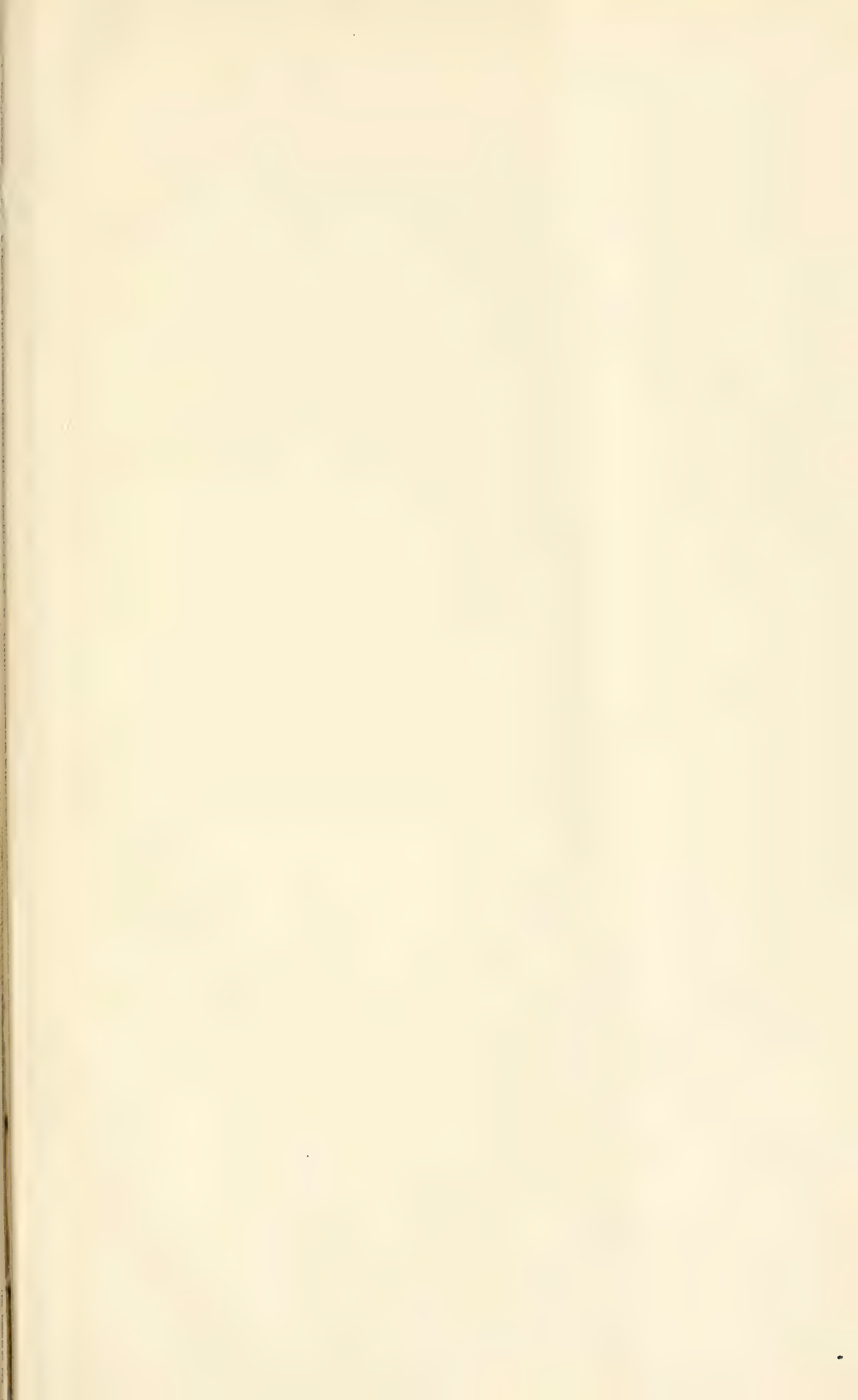
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